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ABSTRACT

A study of the effects and side effects of overcorrection procedures for self stimulatory behaviors of emotionally disturbed children by parents of four severely emotionally disturbed boys (ages 5 to 11 years) is presented. The literature is reviewed in areas such as the use of parents as treatment resources and the use of overcorrection and its effects and side effects. The Ss and settings are described and the procedures used are outlined. The four behaviors targeted for the study were object rolling, hand wringing, hand flapping, and repetitive verbalizations. For each S three positive behaviors (playing appropriately, head orientation, etc.) and three negative behaviors (throwing, body rocking, etc.) were identified. Findings showed that parents were effective change agents with their children and all four target behaviors decreased when overcorrection procedures were applied. Of the positive and negative behaviors identified, head orientation was most sensitive to changes in the self stimulatory target behaviors: as the target behaviors decreased, head orientation increased significantly. Appended are the information given to parents and the treatment plans for each S. (PHR)

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The effects and side-effects of overcorrection procedures for self-stimulatory behavior applied by parents of severely emotionally disturbed children in natural home settings.

by

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CHAPTER I

INTRODUCTION

The growth of educational and treatment programs for severely handicapped children has been hampered by at least two factors. First, existing programs for handicapped children are overwhelmed by the numbers of children in need of special education services (Thompson, 1976). According to Dunn (1973), and Whelan (1966), this problem is especially true for emotionally disturbed children. Second, the number of educational and treatment personnel is reportedly insufficient to adequately serve all handicapped children requiring a special education (Lindsley, 1966). Harvey (1976) has estimated that nearly a quarter of a million additional special education teachers will be needed in the near future.

In attempting to alleviate this personnel shortage problem, educators and psychologists have capitalized on the availability of parents and have attempted to join with parents to form a "therapeutic alliance" (Berkowitz & Graziano, 1972; Sarason, 1971; Wolpe, Salter, & Reyna, 1964). Berkowitz and Graziano (1972) have cited their rationale for including parents in the treatment plans and programs of exceptional children. They suggested that by virtue of

their role,

> parents (1) have assumed the major moral, ethical, and legal responsibility for their children, (2) they generally have the greatest degree of contact with the children, and greatest control over the natural environment, and (3) they are typically both willing and fully capable of assuming and carrying out detailed therapeutic measures. (p. 299)

Over the past several decades, this alliance has been enjoying increasing success, as reflected by the number of reported studies employing parents as behavioral therapists for their own children. In the majority of instances, these studies have reported parents to be effective agents of behavior change (Lindsley, 1966; Mira, 1970). In addition, parents have demonstrated the ability to systematically use natural consequences available to them in cooperative intervention programs involving both home and school environments (Edlund, 1969; Kroth, Whelan, & Stables, 1970; Russo, 1964).

Programs have been developed and implemented in the home for "atypical children" (Ray, 1968), severely mentally retarded children (Mira, 1970), physically ill children (Williams, 1959), predelinquents (Bailey, Wolf, & Phillips, 1970), blind (Guess & Rutherford, 1967), psychotic adolescents (Merbaum, 1973), and emotionally disturbed children (Allen & Harris, 1966). The variety of target behaviors has been equally diverse. Success has been reported with tyrant-like tantrums (Williams, 1959), parent-child dysfunctioning (Hawkins, Peterson, Schweid, & Bijou, 1966), deviant sibling interactions (O'Leary, O'Leary, & Becker,

1967), aggressive behavior (Zeilberger, Sampen, & Sloane, 1968), self-destructive behavior (Merbaum, 1973), and oppositional behavior (Wahler, 1969a).

Although a number of successful parent interventions have been reported, home programs designed to decrease self-stimulatory behaviors, such as body-rocking, hand-flapping, knuckle-chewing, and face-slapping, have been almost non-existent. Berkson and Davenport (1962), and Kaufman and Levitt (1965) have reported that more than two-thirds of institutionalized retardates and psychotic children engage in some sort of self-stimulatory behavior. According to Wells, Forehand, Hickey, and Green (1977), self-stimulatory behaviors "may be dangerous to an individual's health and safety...and have been noted to interfere with individuals' positive interactions with their environments" (p. 679).

Numerous techniques have been reported for the treatment of self-stimulatory behaviors, though very few have been implemented in home settings. Psychotherapy (Bachman, 1972), medications (Davis, Sprague, & Werry, 1969), physical restraints (Friedin, 1977), and various behavioral techniques such as aversive stimulation (Tanner & Zeiler, 1975), and electric shock (Bucher & Lovaas, 1968) have been employed, each demonstrating success to varying degrees. Among these techniques, only aversive stimulation, aromatic ammonia (Tanner & Zeiler, 1975), and electric shock (Bucher & Lovaas, 1968) have resulted in complete suppression of self-stimu-

latory responding. However, the benefits, derived from the use of these techniques, have been countered by at least three factors. First, society, in general, does not accept and condone the wide-spread use of aversive, "painful" procedures with children, especially the severely handicapped (Anderson & King, 1974; Roos, 1974). Second, although desirable side-effects (e.g., increased eye-contact) have been associated with aversive stimulation, these have been largely unsubstantiated by objective data (Hobbs, 1977; Wells et al., 1977). Lastly, Bucher and Lovaas (1968) have reported that severe emotional reactions as well as increases in other self-stimulatory responding have been associated with intense punishment.

As an alternative to punishment and other previously applied techniques, Foxx (1971) developed a behavioral intervention known as "overcorrection" for treating a variety of self-stimulatory behaviors. Overcorrection procedures have also been successfully used to treat public disrobing (Foxx, 1976), toileting problems (Azrin & Foxx, 1971), and scavenging behaviors (Foxx & Martin, 1975). According to Foxx, the procedure typically involves two objectives. The first objective is to overcorrect the environmental effects of an inappropriate act, and the second is to require the disruptor to intensively practice overly correct forms of a relevant behavior.

Foxx and Azrin (1973) showed this procedure to be effective in eliminating mouthing, head-weaving, and hand-clapping stereotyped responding. These results replicated those reported by Foxx (1971) in a previous study. Both of these studies noted an absence of severe emotional reactions (e.g., fear) during overcorrection treatments. In addition, positive side-effects such as attention to adults and appropriate play were reported, although only in anecdotal fashion. The emergence of appropriate play activities during overcorrection treatment periods has also been noted by Epstein, Doke, Sajwaj, Sorrell, and Rimmer (1974), and Wells et al. (1977).

The effects of parents' using overcorrection procedures with their own severely emotionally disturbed children was first reported by Barnard, Christophersen, Altman, and Wolf (1974). Head-banging and hand-biting were effectively reduced by parents using overcorrection procedures in home settings. Suppression effects in the target behaviors did generalize to another setting (special preschool) in which concurrent observations were obtained. This study did not report any collateral side-effects of treatment.

Overcorrection procedures, designed to decrease self-stimulatory behaviors, have been shown to be effective when applied by professionals in various types of clinical environments. Accordingly, there is a need to not only assess the efficacy of overcorrection procedures applied by

parents with their severely emotionally disturbed children, but also to assess the positive and negative side-effects, if any, of such treatment.

Purpose

The purpose of this study was to investigate various overcorrection procedures applied to self-stimulatory behaviors of severely disturbed children by parents in home settings. In addition, changes in untreated behaviors throughout the experiment were systematically noted and analyzed. Specifically, changes in pinpointed positive and negative behavioral correlates, as well as those for the target self-stimulatory behaviors, were evaluated.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of the present study was to investigate the use of various overcorrection procedures for treating self-stimulatory behaviors applied by parents with their own severely emotionally disturbed children in natural home settings. Numerous self-stimulatory target behaviors were identified, observed, and evaluated. In addition, data variations in untreated behaviors (positive and negative behavioral correlates) received statistical examination to determine their relationships to changes in the self-stimulatory target behaviors.

The present chapter surveys the literature related to the issue of employing parents as behavioral therapists with their own children, and to the use of overcorrection procedures. Specifically, the topics to be discussed will be (a) the use of parents as treatment resources; (b) overcorrection, and its components; (c) overcorrection treatment of self-stimulatory behaviors; (d) side-effects of treatment; and (e) generalization effects of overcorrection.

The Use of Parents as Treatment Resources

There is ample evidence to suggest that educational and treatment programs can function more effectively when

paraprofessionals are employed to support and to augment existing services (Guerney, 1969; Lindsley, 1966; O'Dell, 1974). In the majority of published accounts, the use of parents has been the focal point of the research. Since Williams (1959) reported the application of extinction procedures by parents to decrease bedtime problems with their own child, scores of parent-oriented studies have been conducted. Of these studies, the behavioral approach to training and treatment has most frequently been correlated with successful outcomes (O'Dell, 1974). Hence, the primary focus of this review section will be directed toward the application of behavior principles by parents with a variety of child and family problems.

There are a number of advantages for using behavior modification in parent training. Upon reviewing the positive aspects of this approach, O'Dell (1974) listed the following advantages; (a) Behavior modification techniques have been taught to persons unskilled in sophisticated therapy procedures; (b) Behavior modification is based on empirically derived theory, while other training approaches are not; (c) Many persons can be taught the technology at the same time; (d) The training period to reach proficiency is relatively short; (e) A minimum of professional staff can have more treatment impact than in one-to-one treatment models; (f) Many parents like this approach as it does not assume "sickness" as the basis for the problem behavior;

(g) Many childhood problems consist of rather well-defined behaviors that are conducive to behavioral treatment; and (h) Behavior modification is appropriate for treatments applied in natural environments. According to O'Dell (1974),

> parent training is vitally important if effective preventive mental health programs hope to meet the demand for professional services. Also, parent training follows the growing trend toward working in the natural environment and behavior modification offers a relatively easily learned and empirically derived set of concepts for such a parent training model. (p. 419)

Parent training, using behavior modification techniques, has developed markedly over the past several decades. Two stages tend to describe this period. The stage from the late 1950's to the late 1960's seemed to consist mainly of parent training literature which was developmental in content. For example, there have been reports of parents (a) changing the behavior of their own children at home (Williams, 1959); (b) applying different treatment procedures, typically punishment (Risley & Wolf, 1966; Russo, 1964); (c) using behavioral techniques to modify numerous targeted behaviors (Wahler, Winkel, Peterson, & Morrison, 1965; Wolf, Risley, & Mees, 1964); and (d) joining forces with professionals to form a working therapeutic alliance (Wolpe et al., 1964).

Historically, the treatment of child behavior problems was dominated by a closed society of professionals (Wolpe et al., 1964). In the late 1950's, non-professionals,

especially parents, began to assume a more active role in treatment, thus joining a select group of clinicians, psychiatrists, psychologists, and social workers. Probably the first systematic account of parents applying behavioral procedures to treat their own child's behavior at home was offerred by Williams (1959). Working in an atypical treatment setting, the home, one set of parents were taught to eliminate bedtime tantrum behaviors in their 21 month old daughter. Williams instructed the parents to ignore all inappropriate behaviors, thereby placing the child in an extinction condition. Bedtime tantrums were effectively decreased to near zero levels within 2 weeks after initiating extinction procedures. This treatment approach was subsequently validated by reversing conditions to baseline, and then successfully re-establishing the treatment. This study not only opened the door for future parent research efforts, but also demonstrated that parents could effectively apply behavior modification techniques in an uncontrolled situation, collect objective data, and validate the procedures employed.

Behavioral treatment in natural environments was further developed by Wolf et al. (1964). Encouraged by the results of paraprofessional training reported by Ayllon and Michael (1959), these authors designed a study involving both parents and institutional personnel. The subject, a 3 year old schizophrenic boy, was institu-

tionalized by his parents because they were not able to control his behavior at home. He displayed numerous self-destructive behaviors (head-banging, face-slapping, hair-pulling); eating and sleeping problems; severe deficits in verbal behavior; and had serious vision problems for which he refused to wear corrective lenses. In the initial stages of treatment, attendants, nurses, and teachers in the institutional setting used time-out procedures to diminish aberrant behaviors. Concurrently, shaping with differential reinforcement (food and praise) was used to effectively increase verbalizations and other appropriate social behaviors.

After control over the subject's behavior was achieved in the institutional setting, the parents were gradually engaged in the treatment process. First, one parent at a time was brought into the institution setting to briefly interact with the child. Prior instructions and immediate assistance were given by the attendants who trained the subject during the initial stages of treatment. Later, brief home-visits were permitted during which the attendants accompanied the child to the home. On subsequent, longer home-visits, the attendant assumed a lesser role, as the parents acted as the child's behavioral therapist. Within 3 months, the subject was able to stay at home for 3 to 5 nights per week while still attending school at the institution. Eventually, the subject was

able to live continuously at home. The data collected at school supported the favorable anecdotal reports obtained from the parents at home. In a follow-up report, the parents claimed that the subject had maintained all positive behavioral gains, and had become "a new source of joy to the members of his family" (p. 183).

This study accentuated several important points. First, non-professionals in both institutional and home environments were able to successfully employ behavioral principles to modify the deviant patterns of a schizophrenic child. Moreover, systematic and effective transfer to the home setting was effected through the assistance of paraprofessionals, not psychotherapists. The success of this study was dramatized when a follow-up study was conducted 10 years later. Researchers (Nedelman & Sulzbacher, 1972) reported that few signs of the subject's previous maladjustment could be observed. Additionally, the subject had entered a sixth grade class in a regular public school and appeared to be making satisfactory adjustment both socially and academically.

Russo (1964) presented two case studies involving children with behavior problems. A two stage treatment package included clinic and home phases. In the clinic, therapists modeled for the parents appropriate interactions with the children. As the therapist was phased out, parents assumed their role, imitating the demonstrated interactional

patterns. At home, the parents applied the techniques they learned in the clinic, principally, extinction procedures. However, no data were reported on behavior changes at home. Although from an experimental viewpoint this study lacked sophistication, it did demonstrate the training model which was followed extensively in future efforts involving parents as adjunct therapists. That is, parents were trained in controlled clinic settings, and then were requested to apply the learned techniques in the natural environment, the home.

Using this model, Wahler et al. (1965) taught mothers of three preschool aged boys to apply prescribed behavioral techniques. Working in a clinic school's playroom, deviant mother-child interactions were first observed, and then analyzed. Next, the contingencies of reinforcement thought to be maintaining the deviant behaviors were manipulated. The procedures of extinction, differential reinforcement, and time-out were effectively employed to change numerous problem behaviors. Verbal instructions given before and after daily playroom sessions, and a light cueing system used during sessions were employed as training techniques. When the mothers began to appropriately use the prescribed techniques, the function of the light communication system was changed to provide immediate feedback, i.e., reinforcement for correct parental responding. Although successful behavior changes were effected in the playroom setting, no attempts were made

to transfer the procedures to the home environment.

Allen and Harris (1966) described a case study involving a home-based intervention to eliminate self-scratching behavior. A 5 year old girl's self-scratching behavior was effectively diminished at home by her mother. Initially, food and other treats were awarded for varying periods of no scratching. Later, tokens exchangeable for doll clothing, were awarded to the child for not scratching throughout the night. On one occasion, the parent failed to follow through with the arranged contingency, and consequently, the girl resorted to former levels of self-destructive behavior. This study indicated the efficacy of using parents as behavior modifiers and also dramatized the importance of consistency in applying treatment. Still, initial training took place in the girl's school, then was transferred to the home. Again, no objective data were collected to support the efficacy of the procedures employed.

Risley and Wolf (1966) used shaping, reinforcement, and time-out procedures to teach adaptive behaviors to an institutionalized autistic child. After successful laboratory results were achieved, the child was returned to the home setting. Simultaneously the mother was taught to apply the same procedures. The charted data showed that when the parents applied reinforcement, increases in puzzle assembly and picture naming behaviors were noted. In addition, differential reinforcement of other behavior,

used to decrease stereotypic chanting, also proved to be effective. Although the procedures were not experimentally validated, this study is distinguished as it reported one of the first accounts of parent training which was conducted in the child's home. This was also the first report having to do with the training of verbalizations of an echolalic child in a home setting.

Another parent study in which training was conducted in the home environment was presented by O'Leary, O'Leary, and Becker (1967). A 6 year old boy, who had a history of tantrums, fighting, and aggressive behaviors, especially at play with his younger brother, served as the subject. During baseline conditions, the two brothers were observed to exhibit extremely high rates of deviant interactions in a playroom situation at home. Both deviant and cooperative categories of behavior were identified. Thirty minute observations were made three days per week by an independent observer, while the experimenter demonstrated for the parents how to provide verbal praise and food reinforcement for appropriate and cooperative play between the two siblings. Later, an intermittent schedule of reinforcement was implemented without effecting the level of the child's behavior. Tokens, exchangeable for treats, food, and toys, were also instituted. During the second treatment condition, the parents imitated the procedures modelled previously by the experimenter. Five to 8 minute time-out periods in the

bathroom were used to treat the hitting and kicking behaviors of the subject. Tokens were also removed for inappropriate behavior during this experimental condition.

The data showed a successful transfer of control from the experimenter to the parents, with no decrements in appropriate responding from the subject. Anecdotal reports from the mother upon follow-up investigation indicated that therapeutic gains were maintained at home. The parent also reported that aberrant behaviors were effectively decreased during other periods of the day. Finally, it was reported that the subject had begun to ask for food at the dinner table, instead of grabbing for it, and that he would play cooperatively with other children in the neighborhood. In this study, effective treatment for enuresis was reported but no data were presented. Like the study by Wolf et al. (1964), this study indicated that parents could assume treatment responsibilities for their own child in a natural setting. Similarly, hand signals were used to teach appropriate parental responding to child deviant behaviors. Treatment by the parents with professional assistance was shown to be an effective approach to therapy in the natural environment. As reports from others revealed, however, the positive behavior changes encountered at home were not generalized substantially to other settings, such as the child's school.

Risley (1968) employed electric shock with a 6 year old female subject to eliminate autistic behaviors. This treatment procedure was employed only after attempts to apply time-out, extinction, and reinforcement of incompatible behavior techniques were unsuccessful. Upon effectively suppressing aggressive and dangerous climbing behaviors at a laboratory school setting, electric shock procedures were effectively transferred to the home setting. Positive side-effects such as increased eye-contact, and in-seat behavior were associated with decreased autistic behaviors brought about by the electric shock technique. No suppression effects on other negative behaviors were noted. Also, no data were supplied to support the efficacy of the home applications.

Wahler (1969a) designed a study to determine changes in parental reinforcement value in relation to different interventions applied by parents in home settings. Two male subjects (ages 5 and 6 years) and their parents participated in the research. Both boys showed persistent oppositional behaviors such as failure to obey parental commands, screaming, and crying. Five minute time-out periods for non-compliance were employed, while parental approval and physical praise were given for compliance. At different points during the study, a test of reinforcement value of parents was administered to the subjects. The data showed that the experimental procedures produced immediate, and

significant changes in oppositional behaviors for both boys. Moreover, it was found that parental reinforcement value was higher during the experimental conditions.

Zeilberger, Sampen, and Sloane (1968) taught a mother to effectively apply differential consequences to a 4½-year-old boy's behavior. At home, and in several nursery schools, the subject had exhibited high rates of screaming, fighting, disobeying, and bossing behaviors. The parent used 2 minute time-out periods to decrease physical aggression, screaming, and bossing. Verbal praise and special treats were contingently used to increase compliance and cooperative play. The authors pointed out that the treatment was more valid when it was extended for the entire day.

Wahler (1969b), in two separate case studies, examined the effects of modifying inappropriate behavior in the home on the same deviant behaviors at school. The parents of two boys, ages 5 and 8 years, were trained to use time-out and differential attention procedures for the "oppositional" behavior of one boy, and for the "disruptive" behaviors of the other. The results showed that the interventions were effective when applied by the parents in the homes. However, no differences were noted in the same behaviors observed at school, showing no generalization of effects. When the experimental procedures were also employed at school, desirable changes in behavior were

observed in that environment as well.

In the developmental phase, the literature on parent training explored many avenues of parent-child research. The principles of behavior have been successfully applied by parents to change numerous child behavior problems. As O'Dell (1974) concluded, "there does not appear to be any class of overt child behaviors that parents cannot be trained to modify" (p. 421). Moreover, parent interventions have involved both normal and deviant children, and have been conducted in widely varying environments. The actual training, however, has typically been provided in schools, institutions, and clinics (Allen & Harris, 1966; Russo, 1964; Wahler et al., 1965; Wolf et al., 1964). Then, usually at the therapist's discretion, and/or when the behaviors of concern have been brought under adequate stimulus control, parents have been permitted to apply the procedures in the home settings.

A second period, extending from the late 1960's to the present, witnessed an accelerated growth in parent training efforts. Goodall (1972) estimated that two-thirds of such research had been conducted since 1968. Since then, the number of reported parent-oriented studies has nearly doubled. Appropriately, this period may be characterized as one of expansion.

Although the use of behavior modification in parent training has been well documented, the time required to

train parents in behavioral techniques has remained unestablished. Although Lindsley (1966) claimed that the majority of 600 parents achieved success within three attempted interventions, no estimates were offered regarding the time and expense involved in the training. Mira (1970) first responded to the question of time involvement. In comparing the length of time required to train parents individually, and in groups, it was found that personalized approaches took half the time expended on the training of groups. Slightly more than 1 hour total time was required to train parents so that they could effect behavioral changes to criterion levels in their own children. Working within similar conditions, Christophersen, Arnold, Hill, and Quilitch (1972) reported that an average of 10 hours was spent training parents to effectively implement the prescribed intervention procedures. The fact that much of Christophersen et al.'s training took place in the parents' homes probably accounted for the increases in training time. In comparison to Masserman's (1963) claim of 600 hours of psychotherapy required to effect therapeutic gains in neurotic patients, the reports of Mira (1970), and Christophersen et al. (1972) assume great significance, implying considerable time savings.

It was also during this period that the professional therapeutic community began to recognize parents as co-therapists (Franks & Susskind, 1968). Accordingly, studies in

parent training were increasingly regarded as joint, co-operative ventures between therapists and parents. In conjunction with the assumption of mutual therapeutic responsibilities, parents began to be viewed as agents for preventing mental health problems in children. This position is supported by many psychotherapists who see parent-child relations as the vestage of mental health (Hawkins, 1972). Berkowitz and Graziano (1972) viewed the objective of parent training as a preventive measure, making parents problem solvers, rather than service seekers. According to O'Dell (1974), "it is an axiom of problem solving that prevention supercedes cure" (p. 419). Glidewell (1971) considered the prevention of disorders in childhood to be the highest priority in community mental health. As parents have more actively participated in natural settings as co-therapists, their role in fulfilling this goal has become increasingly more important (Berkowitz & Graziano, 1972).

Historically, parent training studies employing behavior modification techniques have concentrated on decreasing undesirable, and deviant behaviors. In recent years, more novel and complex behaviors have been effectively treated using this approach. Additionally, research has begun to focus on methods for teaching appropriate social skills in natural environments.

Zlutnick, Mayville, and Moffat (1975) investigated the effects of interruption and differential reinforcement techniques on the psycho-motor seizures of five children. Believing that seizures are the terminal link in a predictable behavioral chain, procedures were designed to interrupt the sequence, there by stopping the seizure. Interruption procedures were successfully applied both at school and at home by parents. Decreases in seizure actitivy were recorded for four of the five subjects. The results suggested that seizure activity may contain operant and controllable components and that parents as well as professionals may be able to modify the frequency of seizures.

Aragona, Cassady, and Drabman (1975) employed the parents of 13 overweight females (CA's 5 to 11 years) to study several weight reduction procedures. A control group and two experimental groups were involved in the study. In one experimental group, children were reinforced for progressive weight loss, while the parents were fined portions of an enrollment fee for failures to submit charted behavior or attend weekly meetings. The second experimental group employed the response-cost procedures only. The results showed that the two experimental groups differed significantly from the control group after 12 weeks of treatment. In a follow-up survey after 9 months, there were no differences between all three groups. However, the response-cost plus reinforcement group showed a slower

trend of weight regaining.

Rekers and Lovaas (1974) extended the application of behavioral techniques used by parents to modify deviant sex-role behaviors. Effective treatment was conducted at home, and at a clinic by a boy's mother. Specifically, token reinforcement and social praise were given by the mother to reinforce masculine statements and activities.

Kifer, Lewis, Green, and Phillips (1974) designed a study in which three parent-child pairs were taught negotiation skills. All three subjects were adolescents who had histories of extreme conflicts with their parents and with other authorities. Hypothetical conflict situations were held between parent-child pairings in a clinic setting. Specific conflicts were described in each case. A therapist then helped the subjects simulate mutually satisfying negotiations. According to reports obtained during home visits, generalizations of training were achieved.

Barnard, Christophersen, and Wolf (1977) sought to improve the supermarket shopping behavior of three school-aged boys. Using token reinforcement and response-cost procedures, parents were able to significantly increase proximity to the parent and decrease the percentage of food-product disturbances. Following similar procedures, Clark, Greene, McCrae, McNees, Davis, and Risley (1977) reported equivalent successes. Both of these studies represent important extensions of laboratory developed procedures into

naturalistic environments.

Knight and McKenzie (1974) studied the effects of contingent and non-contingent story reading on the thumb-sucking behavior of three female subjects. The girls, ages 3, 6, and 8 years, were all chronic thumb-suckers. Two had developed accompanying dental disorders. During the baseline period each of the mothers read to their children at bedtime regardless of whether they were engaging in thumb-sucking. During the intervention periods, the mothers were instructed to stop reading when the subjects sucked their thumbs, and to continue when thumb-sucking stopped. Bedtime thumb-sucking was eliminated for all three girls. This study replicated and expanded to naturalistic settings, procedures previously developed by Baer (1962).

Parent-training models and teaching techniques have varied considerably, though tending more in recent years toward natural environments. As Ross (1972) wrote:

> If behavior is to be modified, the modification must take place when and where the behavior manifests itself. This is rarely the therapist's consulting room, and as a consequence, behavior therapists working with children frequently find themselves working through the adults who are in a position to be present when the target behavior takes place, and who have control over the contingencies of reinforcement. (p. 919)

Nordquist and Wahler (1973) demonstrated that parents can successfully apply reinforcement techniques to modify autistic behaviors in a home setting. After being

trained in a clinic setting, parents were able to apply time-out procedures in the home for ritualistic responding, crying, and whining. The parents were also trained to reinforce verbal and non-verbal imitations using natural, and readily available positive consequences.

Hall, Axelrod, Tyler, Grief, Jones, and Robertson (1972) taught parents to effectively operate as both observers of and behavioral therapists for their own children. Four parents, enrolled in a "Responsive Teaching" class, demonstrated that behavioral principles taught to parents in one environment could be successfully applied in another, the home. Behaviors such as wearing an orthodontic device, doing daily household chores, and getting dressed on time each morning were effectively treated. In one case, whines, cries, and complaints were effectively decreased by removing adult attention when the behaviors occurred. Reversals to baseline conditions experimentally validated each of the procedures used in the homes.

Several studies have reported on the effects of various behavior recording systems used in parent training (Herbert & Baer, 1972; Johnson, Christophersen, & Bellamy, 1976). Johnson et al. (1976) investigated the use of an electronic bugging device for recording parent-child interactions. The device was worn by each of the five parents while at home. Daily recordings were made at random, and at fixed intervals determined by parents.

The results showed significant changes in parent-child interactions when recording intervals were selected by the parents. When recordings were made at random, changes in parental behavior were not evident, suggesting considerable bias in the recording system.

Herbert and Baer (1972) examined the effects of self-recording by parents on their own behavioral interactions with their children. Three mothers were given wrist-counters and were instructed to record the frequency of attention given to appropriate child behaviors in home settings. An independent observer verified that the appropriate behavior of two children improved as appropriate parental attention increased. Removal of the wrist-counters did not produce a reversal of effects. Maintenance checks over the next 5 months showed the effects to be durable as well as initially simple and inexpensive. The third parent-child pairing showed no changes as a result of the treatment.

Other physical devices have been used to assist parents in applying behavior modification techniques. Moore and Bailey (1973) used an electronic cueing device to teach behavioral techniques to a mother in a clinic school setting. The subject, a 3 year old autistic-like girl, and her mother were involved in special training sessions 4 days per week. During baseline, the mother was instructed to ask her daughter to perform specific pre-academic tasks, such as to stack blocks and to place

rings on a stick, and to comply with certain social requests such as "Look at me". When electronic cueing was implemented, the researcher prompted the mother to apply either approving or disapproving types of behavior in relation to the child's responses. During this intervention phase, both child response categories were markedly increased. Gains in the child's responding were maintained even when the cueing device was removed. Follow-up observations at 1, 5, and 7 months after treatment showed that the increases were maintained.

Christophersen et al. (1972) taught two sets of parents to use a home point (token) system to modify behaviors in the home setting. Across a total of five children (CA's 5 to 10 years), all 21 identified behaviors were effectively changed in the home. The study also showed that only a small amount of the professional's time was required for the parents to learn the essentials of behavior modification. For example, the total time spent training both families was only 20 hours. This study also represents one of the first efforts to teach reinforcement principles in the the natural environment to parents. Professionals visited each home and focused the instruction of behavior management techniques on child behavior problems as identified by the parents.

Several parent training studies have indicated the degree to which parents can influence the outcome of be-

havior techniques. Johnson and Lobitz (1974) reported that systematic observation in naturalistic settings is an important assessment device in the evaluation of treatment approaches and basic social research. Twelve families with 4 to 6 year old children were recruited for the study. During the 6 day observation period, parents were instructed to make their children "look good" on 3 days, and to "look bad" or "deviant" on alternate days. Independent observers visited the homes and collected data on 35 behavioral categories. It was found that child deviant behaviors, parental negative responding, and parental commands were all significantly higher on bad than on good days. The results indicated that parents can manipulate the deviancy level in their children in response to instructions. Much of the increase in deviancy was attributed to increased parental commands. Although it was shown that parents intuitively "know" how to make their children "look bad", they apparently didn't "know" how to increase positive behaviors on "good days". There were no significant differences in compliance measures across the two experimental conditions.

Herbert, Pinkston, Hayden, Sajwaj, Pinston, Cordua, and Jackson (1973) reported on the adverse effects of differential attention for two independent parent training programs. Mothers of deviant young children were found to almost always follow inappropriate behaviors with attention.

During treatment, mothers were instructed to use differential attention procedures. No attention was given to deviant behaviors, thus placing the children in a state of extinction. Praise and physical closeness were employed to increase appropriate behavioral patterns. Contrary to the researchers' expectations, the differential attention procedure produced substantial increases in deviant behaviors, such as hitting their mothers, self-scratching, and dangerous play for four of the six subjects. The implications of these results suggest that for some deviant children the manipulation of parental attention can have serious limitations. This has been especially apparent when the adverse effects have occurred in loosely controlled settings such as the home.

Budd, Green, and Baer (1976) also used time-out and contingent forms of adult attention to modify inappropriate non-compliant behaviors. Adult differential attention tended to increase desired behavior. However, concurrent increases in other inappropriate behaviors were noted. When time-out procedures were added, more successful results were reported. These results replicate those of Herbert et al. (1973), and Wahler (1969a) in demonstrating the failure of differential social attention to increase appropriate behavior, when used as a single treatment strategy.

Studies of this type, in which unusual results have been encountered, have prompted researchers to more closely

examine the characteristics of participating parents. According to O'Dell (1974), "studies that take measures on parents in order to relate them to differential successes are even more infrequent" (p. 421). Mira (1970) did not find a relationship between parent's education, intelligence, or socioeconomic level, and subsequent training success. However, Mira (1970) seemed to minimize verbal learning and emphasized direct teaching of parent behaviors. Studies emphasizing verbal learning and didactic instruction, and which relied on both educational level and reading ability, have involved individuals categorized as college educated parents (Hall et al., 1972; Salzinger, Feldman, & Portnoy, 1970). Conversely, Patterson, Cobb, and Ray (1972) reported that uneducated, lower socioeconomic parents were difficult to train. Troubled families and parents without spouses also fell into the "difficult to train" category. Reports dealing with the personality or psychiatric classification of parents are infrequent in the literature. In general, parent trainers have reserved instruction for those free of overt pathology (Bernal, Williams, Miller, & Reagor, 1972; Patterson, 1965).

Gelfand and Hartmann (1968) concluded that the type of parent training program can interact with individual parent characteristics. O'Dell (1974) offerred several tentative conclusions. First, more highly educated parents may respond better to verbal learning, or didactic approaches.

Secondly, a wider range of parents may be taught if actual behavioral learning and individually tailored programs are emphasized.

The issues of generalization and maintenance are crucial to any training program. Lovaas, Koegel, Simmons, and Long (1973) reported that therapeutic gains were maintained for autistic children whose parents applied behavior therapy techniques in home settings. Conversely, those children who were institutionalized in facilities where reinforcement techniques were not systematically employed tended to regress.

Miller and Sloane (1976) designed a study in which the generalization effects of language training were measured across numerous settings. The parents of five nonverbal children were trained to use social praise and hugs, and portions of snacks to reinforce prompted vocalizations at home. Similar training was conducted at school. Observations of vocalizations were also collected at school during a free-play period. The results showed that all subjects increased vocalizations as a function of training at home. Generalization of language training to another time at home showed increases; albeit the increases were minimal. At school, only one child showed systematic increases in language training sessions as a function of training at home. Observations made during a free-play setting at school showed increases in the average number

of vocalizations as a result of home language training. However, due to within-subject variability, these increases were considered not to be significant, and therefore inconclusive (Miller & Sloane, 1976).

According to Miller and Sloane (1976), generalization occurred only minimally even though the stimulus settings were physically similar. It was stated "it appears that generalization must be programmed" (p. 369), a conclusion earlier reported by Baer, Wolf, and Risley (1968), and Walker and Buckley (1972). Although several studies (Herbert & Baer, 1972; Moore & Bailey, 1973) have reported achieving maintenance of therapeutic gains, there is no concensus regarding specific methodology. As O'Dell (1974) concluded, "the technology has not yielded well-developed techniques for producing generality and durability of parent behavior changes" (p. 425).

Summary

After nearly 20 years of research in parent training using behavior modification techniques, some conclusions may be drawn. As reviews by Berkowitz and Graziano (1972), Johnson and Katz (1973), and O'Dell (1974) have pointed out, parents have successfully modified a wide variety of child behaviors, both deviant and adaptive. As subjects, children from virtually every exceptionality have participated with

their parents and caretakers. In turn, effective modifications have been demonstrated in homes, clinics, schools, and institutions.

The issue of where treatment should be initiated remains unresolved. However, it appears that the most logical approach is to provide training in the environment in which the problem behavior or concern manifests itself. Clearly generalization problems exist when the effects of training fail to transfer across settings (Miller & Sloane, 1976; Wahler, 1969b). When parent training is conducted in the home, or in natural environments, generalized problems are minimized (Christophersen et al., 1972).

The interaction of parent training approaches and certain parental characteristics has received minimal research attention. While socioeconomic level does not seem to be a significant variable (Mira, 1970), the educational background of parents would appear to be important (O'Dell, 1974). Parents with moderate to high verbal capacities would appear to prosper from a didactic instructional approach (Hall et al, 1972). Conversely, parents with lesser verbal skills tend to learn more effectively with a demonstration and actual practice approach (O'Leary et al., 1967; Wolf et al., 1964). Hence, an initial assessment of certain parental characteristics would appear to be useful in designing appropriate instructional strategies.

Other important instructional considerations have been presented. Herbert et al. (1973) pointed out that a single treatment approach, differential reinforcement of other behaviors, can foster adverse effects. Two-thirds of the subjects reacted to this presumably positive procedure by hitting their mothers, self-scratching, and by engaging in dangerous play activities. O'Leary et al. (1967) also encountered this problem. By combining reinforcement with a punishment procedure, time-out from reinforcement, the targeted behaviors were effectively brought under control. As Baer (1970) pointed out, therapists are hesitant to apply punishment procedures. According to Baer (1970), objections to the use of punishment are based more upon subjective, moralistic opinions, than upon objective research findings. Responding to this, Wahler (1969a) reported that the reinforcement value of parents markedly increased during time-out (punishment) intervention conditions. Since then, instructional strategies for parent training have included dualistic objectives. Reinforcement for desirable behaviors has been frequently combined with some type of punishment contingency aimed at decreasing aberrant behaviors.

Overcorrection, and its Components

The development of effective new behavioral techniques to treat deviant behavior is important. When

traditional reinforcement and punishment procedures fail to be effective with specific deviant behaviors, behavioral technology must be expanded to include new forms of treatment. One promising and recent development is overcorrection. According to Foxx (1971), and Foxx and Azrin (1973), overcorrection consists of two objectives. They are (a) to overcorrect the environmental effects of the inappropriate act, and (b) to require the disruptor intensively to practice overly correct forms of relevant behavior.

The method for achieving the first objective is termed "restitutional overcorrection" and requires "the disruptor to correct the consequences of his misbehavior by having him restore the situation to a state vastly improved from that which existed before the disruption" (Foxx & Azrin, 1973, p.2). For example, an individual who smears his feces on the floor would be required to wash, clean, and then wax the floor. A method known as "positive practice overcorrection" is used to achieve the second objective. This requires the individual who smears feces to eliminate in the toilet, then cleanse and bathe himself. Restitutional overcorrection is applicable, when the misbehavior disrupts the environment. However, as Foxx and Azrin (1973) have noted, "since self-stimulatory behavior often has no effect on the environment, the positive practice overcorrection procedure would be used alone in those instances" (p.2).

According to Foxx (1971) and Surratt (1971), overcorrection procedures were designed to possess the following five characteristics: (a) the behavior which is to be positively practiced must be constructively related to the misbehavior. This characteristic is based upon Thorndike's (1932) contention that punishment does not teach; only practice and reinforcement can be educative. Foxx (1971) asserted that punishment techniques are not constructively related to the misbehavior, since they are selected for their annoyance value rather than their educative value. The rationale behind positive practice overcorrection does assure this meaningful selection. (b) The overcorrection procedure must immediately follow the misbehavior. Azrin (1956), and Azrin and Holz (1966) demonstrated that immediate negative consequences were most effective in eliminating undesirable behaviors. Immediate temporal pairing of overcorrection with the occurrence of the misbehavior reduces any reinforcement which might follow the behavior and essentially places the individual in an extinction condition (Foxx, 1971). (c) The overcorrection must be extended in duration, thereby serving as a time-out condition since the individual will be actively involved in the corrective acts. According to Zimmerman and Bayden (1963), time-out is more effective at longer durations. (d) The corrective acts involved in positive practice overcorrection procedures must be

actively performed by the offender. Miller (1968) reported that physical effort is known to function as an inhibitor. Hull (1943) referred to this as reactive inhibition. That is, in a repetitive sequence of actions, each movement contributes one unit of fatigue, which progressively serves to decrease the individual's physiological capacity to respond. (e) Positive reinforcement, especially in the form of attention, must be minimal during overcorrection treatments. According to Foxx (1971), minimal positive reinforcement can be achieved by delivering instructions in neutral tones. Whenever the offender fails to follow a verbal instruction, he must be manually guided through the required response by the trainer, who provides only enough pressure to insure that the desired movement is initiated and completed (Foxx & Azrin, 1973). As the offender begins independently completing the required response, the pressure is lessened to just a touch, and then faded completely. Should the offender's desired movement slow down or stop, just enough pressure must be reapplied to restore the movement to the desired rate. The verbal instruction thus becomes a conditioned stimulus as in a conditioned avoidance situation whereby the offender can avoid the manual guidance by following the instructions. Eventually, the verbal instructions alone should maintain the desired behaviors as in conditioned avoidance (Azrin, Holz, & Hakes, 1962).

Overcorrection Treatment of Self-Stimulatory Behaviors

Baer, Wolf, and Risley (1968) have suggested that the effectiveness of a procedure may be shown by successful replications with different behaviors, target populations, localities, and with different people applying the procedure. Overcorrection procedures have been used successfully with a wide variety of self-stimulatory behaviors. Webster and Azrin (1973) reported a number of effective treatments, one involving severe self-injurious behavior (SIB). Using a positive practice overcorrection procedure, which required physical relaxation, head-banging was suppressed to near zero levels by the fifth day of training. In another study, Azrin, Gotlieb, Hugart, Wesolowski, and Rahn (1975) reported using positive practice overcorrection procedures to treat eleven cases of SIB. The average reduction in the rate of SIB (head-banging, and knuckle-chewing) by the first day was 90 percent. By the seventh day of treatment, a reduction of 96 percent had been achieved for all subjects.

Overcorrection procedures have also been implemented to treat self-stimulatory behaviors of lesser severity. Foxx and Azrin (1973) demonstrated overcorrection to be effective in completely eliminating mouthing, head-weaving, and hand-clapping self-stimulatory behaviors. An oral hygiene procedure, more fully described by Foxx and Azrin (1972), was used to treat mouthing responses. This pro-

cedure required that the gums and teeth be brushed with oral antiseptic following the targeted behavior. Then the facial area around the mouth was wiped with a wash-cloth, dampened with the antiseptic. Each application of the procedure lasted for 2 minutes. Head-weaving self-stimulatory behaviors were treated using functional movement training. The procedure, lasting 5 minutes, required the subject to respond to three verbal commands by holding her head up, down, or straight. Each position was maintained for 15 seconds. For the overcorrection of hand-clapping, a 5 minute functional hand movement training procedure was employed. The subject was instructed to move his hands in response to one of five verbal commands. Hands were moved above the head, into the pockets, straight out in front, held together, and held behind the back. Again each position was maintained for 15 seconds. In all three treatments, manual guidance from the adult manager was provided if the subject refused to comply with the verbal commands.

The data showed near complete suppression for all target self-stimulatory behaviors within 5 to 10 days after overcorrection was implemented. The target behaviors were maintained at zero levels for extended periods of time by using verbal warnings. This study also represented an extension of an earlier study by one of the authors (Foxx, 1971). It was shown that the effects of overcorrection on mouthing behavior could be extended to the entire day, in-

stead of for a brief training session.

Herendeen, Jeffrey, and Graham (1974) also achieved positive results with overcorrection in the treatment of the stereotyped rocking and mouthing behaviors of a 13 year old retardate. Using the functional movements and oral hygiene procedures, described earlier, rocking and mouthing were each reduced significantly within a brief period of treatment. Rollings, Baumeister, and Baumeister (1977) used functional movement training, a positive practice overcorrection procedure, to effectively decrease high rate body-rocking to a near zero rate in one retardate, while the same procedure failed to produce decreases in head-weaving in another subject.

Epstein, Doke, Sajwaj, Sorrell and Rimmer (1974) used functional movement overcorrection procedures to decrease stereotyped hand and foot movements and inappropriate vocalizations in two retardates. These behaviors were suppressed to levels under 5 percent. Similar decrements in inappropriate object manipulation, inappropriate hand movements, and mouthing responses were also observed in two autistic children (Wells, Forehand, Hickey, & Green, 1977). Positive practice overcorrection, appropriate play with toys, was used to treat the target behaviors.

Doke and Epstein (1975) also reduced mouthing in two retardates from means of 25 and 50 percent during baseline periods to levels under 10 percent during the oral

hygiene overcorrection treatment condition. Contingent verbal warnings that overcorrection would be administered were used to maintain zero levels of mouthing in subsequent phases of the study.

Overcorrection procedures have been successfully applied to different populations of subjects, and in a variety of localities. Foxx (1971), and Foxx and Azrin (1973), who pioneered the overcorrection technique, originally applied these procedures to profoundly and severely mentally retarded out-patients, enrolled in a special day-care program. Overcorrection procedures were applied by a teacher in a small training room, and in an indoor playroom (Foxx, 1971). The same overcorrection procedures were later extended to include the entire length of the day-care school program (Foxx & Azrin, 1973).

Using a positive practice overcorrection procedure, Wells et al. (1977) treated two brain-damaged, mentally retarded and severely emotionally disturbed subjects in a special school for the developmentally handicapped. The subjects, 10 year old fraternal twins, exhibited numerous self-stimulatory behaviors during free-play periods with toys. When any one of four target behaviors was observed, the teacher would say, "Stop that!", and engage the child in manually guided appropriate play with a toy for 2½ minutes. Treatment was limited to a playroom setting. The results showed that all target behaviors were significantly

suppressed during the overcorrection condition. Epstein et al. (1974), and Doke and Epstein (1975) also demonstrated the effectiveness of overcorrection procedures in specialized day-care environments with autistic-like children.

Simpson and Sasso (in press) were among the first to apply overcorrection procedures in a public school special education environment. The subject, a 10 year old severely emotionally disturbed male, frequently engaged in "rumination". This rare behavior involved the voluntary movement of food from the stomach into and from the oral cavity. Rumination was frequently observed during or shortly after mealtime, although it was not limited to these time periods. When this behavior was observed, the teacher would immediately approach the child, open his mouth and squirt a small quantity of lemon juice into the subject's mouth. He was then told to swallow it. The teacher's hand would remain over the child's mouth to aid him in consuming the juice. Next, the facial area was washed with warm, soapy water and a cloth for 30 seconds. This was followed by drying the face, and then applying a face lotion to the effected area for an additional 15 seconds. This restitutional overcorrection procedure completely eliminated this self-stimulatory behavior within 1 week after treatment was initiated. A continued visual display of the squirt bottle, used to administer the lemon juice, maintained zero levels of rumination behavior for extended periods of time.

Using another restitutional overcorrection procedure, Newman, Whorton, and Simpson (1977) demonstrated marked reductions in another self-stimulatory behavior in a public school setting. The subject, an 8 year old severely disturbed and functionally mentally retarded child, frequently engaged in inappropriate stereotypic verbalizations. Throughout the school day, these verbalizations interfered with the child's academic performance and that of the entire class. Following a baseline period of 6 school days, characterized by extremely high frequencies of verbalizations (mean = 196 per day), an overcorrection procedure was initiated. Whenever inappropriate verbalizations, such as "dyah", "bic", and "bah", were heard, the teacher would say "No noise!" in a firm, yet bland tone. Next, the teacher's hand was placed over the child's mouth firmly in such a manner that noises could not be made. The hand was held in place for 30 seconds, whereupon it was removed, and the teacher said "Good being quiet!". The hand-over-mouth procedure was extended each time the child emitted a noise during the normal 30 second treatment period.

Since the treatment condition, which included the verbal warning, failed to suppress the target self-stimulatory behavior, that component was terminated. It was found that the restitutional overcorrection without the verbal warning produced the most significant and long lasting effects. Inappropriate verbalizations were de-

creased from a mean of 156 per day to only 13 daily during the final treatment phase.

In an attempt to modify head-banging, Harris and Romanczyk (1976) used a functional movement overcorrection procedure to treat an 8 year old retardate. Overcorrection administered at the child's special school decreased head-banging from a baseline mean of 32 occurrences per day to near zero after 2 weeks of treatment. Although no changes in head banging were observed in the home over this period, this target behavior was subsequently reduced from a baseline mean of 15 behaviors per day to zero when the overcorrection procedure was transferred to that setting. No description was provided regarding the implementation of the procedures in the home, or who applied the overcorrection treatments. Foxx and Azrin (1973) reported quite similar results from their study. Again, no data on the home applications were obtained. Newman et al. (1977) also reported successful transfers to the home setting, but did not provide supporting information.

Although several studies have reported successful applications of overcorrection procedures in home settings, only one study has systematically investigated the use of overcorrection by parents in home environments. Barnard, Christophersen, Altman, and Wolf (1974) were the first to systematically conduct an overcorrection study in home settings where parents acted as therapists for their own

children. The four subjects (CA's 15 months to 4 years of age) had been associated with various diagnostic labels, such as brain-injured, multiply handicapped, and autistic. Each of these children also evidenced severe retardation of intellectual development. Two sets of overcorrection procedures were implemented by the parents to treat hand-biting and head-banging behaviors. One of the subjects was treated for both of the target behaviors.

Overcorrection for hand-biting consisted of the following procedures. They were:

1. A 2 minute oral hygiene procedure (cf. Foxx & Azrin, 1972, 1973), in which the child's teeth and gums were brushed with "Listerine".
2. Two minutes of hand washing, especially on the effected area, using a cotton swab and mild soap.
3. One minute of hand drying using a small dry cloth.
4. Two minutes of applying a small dab of handcream to the effected area.

Overcorrection for head-banging followed a similar 7 minute procedure. This procedure consisted of the following:

1. For 3 minutes, an icepack was applied to the child's head.
2. For 2 minutes, the bumped area was washed with a cotton swab and mild soap.
3. The head was dried with a small cloth for 1 minute.

These procedures were solely "restitutional overcorrection", by design. Positive practice overcorrection

was not applied. A kitchen timer was used by the parents to measure the durations for all overcorrection components.

Overcorrection procedures were employed within a multiple baseline experimental design for small or single subject studies. This allowed each subject to act as his own control (Sidman, 1960). All interventions were carried out by parents in their own homes on their own children. Data gathering and reliability checks were conducted by independent observers on a regular basis in the homes.

The data showed that the oral hygiene procedure effectively eliminated the hand-biting for all target subjects. However, only two of the three overcorrection treatments for head-banging completely eliminated this self-injurious behavior. Even doubling the length of the overcorrection procedure for the one subject's head-banging failed to produce any decreases. Instead, increases in head-banging eventually forced the termination of the procedure. From the data provided by Barnard et al. (1974), it appeared as if this child's parent reported the least observational data, and also attained the lowest reliability coefficients. All of this reflects more on the parent's ability to apply the overcorrection procedure than on the effectiveness of the treatment, per se. Although observations of the target behaviors were obtained in two settings, home and school, no collateral behavior data were collected or reported.

Summary

Overcorrection procedures, originated by Foxx (1971), have been shown to be effective with a variety of self-stimulatory behaviors (Doke & Epstein, 1975; Epstein et al., 1974; Rollings et al., 1977), and self-injurious behaviors (Azrin et al., 1975; Webster & Azrin, 1973). Both mentally retarded and emotionally disturbed children (Harris & Romanczyk, 1976; Newman et al., 1977) and adolescents (Herendeen et al., 1974; Wells et al.,1977) have been successfully treated using overcorrection procedures. Restitutional and positive practice forms of overcorrection, applied separately, or in tandem, have also been employed with equivalent results by therapists and teachers (Newman et al., 1977; Webster & Azrin, 1973; Simpson & Sasso, in press), and by parents (Barnard et al., 1974). Additionally, successful treatment has been implemented in institutional settings (Foxx, 1971; Foxx & Azrin, 1972, 1973; Wells et al., 1977), in public school classrooms (Newman et al., 1977; Simpson & Sasso, in press), and in the home (Barnard et al., 1974).

Overcorrection, especially when used to treat self-stimulatory behaviors, has shown certain characteristics. Perhaps the most striking feature of overcorrection is that it has produced behavior change in a relatively brief treatment period. Near complete suppression of the target be-

havior has typically been achieved within 1 to 2 weeks after treatment has been implemented (Azrin et al., 1975; Webster & Azrin, 1973). Hence, the time spent applying the procedure, though great initially, has quickly been diminished to a manageable amount (Hobbs, 1977).

Side-effects of Treatment

The problem of deviant self-stimulatory behavior competing with academic performance constantly faces the classroom teacher. As Kauffman (1974) has suggested, "teachers cannot allow self-stimulatory behaviors to continue unabated if they are to be effective. Learning clearly seems not to occur while a child is engaged in such behavior" (p. 402).

Foxx (1971) contends that an inverse relationship exists between self-stimulatory behavior and appropriate responses to external stimuli and thus self-stimulatory behavior may hinder the development of adaptive behavior. Campbell (1968) compared retardates who self-stimulated with retardates who did not, and found that the self-stimulator's contact with environmental stimuli tended to be fleeting, repetitive and destructive. Concurring with these statements, Simpson and Sasso (in press) stated that "greater academic productivity and socialization efforts were observed" (p. 8) as a function of decreases in self-stimulatory responding.

According to Koegel and Covert (1972), it has been generally assumed by behavioral researchers that in order for severely disturbed children to learn new skills, self-stimulatory behavior must be eliminated from their behavioral repetoires. It was shown that during periods when self-stimulatory behaviors (rocking, hand-flapping, hair-twisting) were decreased, the three subjects quickly learned to bar-press for reinforcement. Koegel and Covert's data strongly suggest that if autistic children are to learn, these children should not engage in self-stimulation during academic instruction.

Bucher and Lovaas (1968) reported that self-stimulation was inversely related to correct responding in structured language training sessions. Doke and Epstein (1975) used oral hygiene overcorrection procedures to decrease thumbsucking, mouthing, and object-spinning during daily language training sessions. Although the procedure effectively suppressed the target behaviors, no data were reported regarding language productions. Newman et al. (1977) applied overcorrection effectively to inappropriate verbalizations in a public school program. An analysis of the subject's performance in language training sessions showed that overcorrection treatment "did not adversely affect his development of more appropriate and functional communicational skills" (p. 162). Again, data on academic performance were not reported.

Bucher and Lovaas (1968), and Koegel and Covert (1972) have presented evidence to support the contention that self-stimulation and academic performance are inversely related. A number of other authors have concurred with this relationship, but have not based their decisions upon data. Nevertheless, there seems to be enough evidence to suggest that decreases in self-stimulatory behaviors give rise to the development of more adaptive, and outwardly directed behaviors.

The question of behavioral side-effects to treatment has been examined by several authors (Doke & Epstein, 1974; Epstein et al.,1974; Hobbs, 1977; Risley, 1968). Side-effects have been refined into positive and negative behavioral categories so as to study the relative changes, if any, in each as a function of treatment. Hence, each type of behavioral side-effect could vary in a desirable or undesirable fashion with the changes in the target self-stimulatory behaviors.

Kauffman (1974) has reported that most of these references are of a positive nature, citing increased sociability, eye-contact, and cooperativeness. For example, studies using electric shock have contended that positive side-effects such as increased attention to adults has occurred during treatment (Bucher & Lovaas, 1968; Lovaas & Simmons, 1969). Conversely, Corte, Wolf, and Locke (1971) reported that the use of mild shock contingent upon a target

self-stimulatory behavior exhibited by a retarded female subject was associated with markedly increased rates of self-injurious behavior, such as face-slapping, hair-pulling, and finger-biting.

In several of the early studies on the effectiveness of overcorrection for self-stimulatory behaviors, Foxx (1971), and Foxx and Azrin (1973) anecdotally reported a variety of positive side-effects, such as increased attention and responsiveness to adults associated with the use of overcorrection. It was reported by one teacher that the subject "seemed much more alert and that her attention to various training tasks had increased" (Foxx & Azrin, 1973, p. 9). However, no data have been reported to support the acquisition of these functional behaviors.

Several researchers have sought to systematically determine the relationships between changes in treated self-stimulatory behaviors and other untreated responses. Epstein et al. (1974) observed both positive and negative side-effects in a study in which positive practice overcorrection was used with two subjects to decrease inappropriate hand and foot movements and inappropriate self-stimulatory vocalizations. The overcorrection procedures resulted in reductions in all target behaviors to near zero levels. For one subject, appropriate toy play during a free play period increased from a mean of approximately 15 percent in base-

line to a mean of nearly 35 percent when self-stimulatory movements were reduced using a functional hand movement overcorrection procedure. These findings correspond to those of Koegel and Covert (1972), Koegel, Firestone, Kramme and Dunlap (1974), and Risley (1968), who each used different forms of punishment.

Epstein et al. (1974) observed a different behavioral relationship with the second subject. When the target behavior, inappropriate vocalizations, were suppressed during nap-time, inappropriate food movements increased. Through-out a reversal design, these two self-stimulatory behaviors maintained an inverse relationship. An examination of two other self-stimulatory behaviors, inappropriate hand and food movements, showed that overcorrection for one behavior had no effects on the other.

Rollings, Baumeister, and Baumeister (1977) effectively applied positive practice overcorrection, functional movement training, to a retardate's self-stimulatory body-rocking. Early in the treatment phase, marked increases in self-hitting, another self-stimulatory behavior, were observed. However, the rate of self-hitting decreased with extended training, suggesting extinction of this negative behavior correlate in the training environment. According to Baumeister and Rollings (1976), this type of behavior may have occurred during treatment "because self-injurious behavior had been

successful in avoiding or escaping from unpleasant situations in the past" (p. 12). Following this logic, the self-hitting extinguished in the training situation because it was ineffective in providing an escape from overcorrection treatment.

Positive practice overcorrection is designed to be an educative procedure (Foxx, 1971; Surratt, 1971). It was intended to teach adaptive behaviors as well as to decrease inappropriate responding. However, as Hobbs (1977) pointed out, there is very little evidence to support the "educative" claims for overcorrection. A study by Wells et al. (1977) represents the only controlled investigation of the effects of overcorrection on the acquisition of appropriate behavior. Positive practice overcorrection, thought to be an educative process, not only decreased the frequency of object-spinning and mouthing stereotyped behaviors, but also served to facilitate the acquisition of the practiced behavior. Appropriate toy-playing behavior was significantly increased in one autistic subject, while another failed to learn this skill. In neither case, however, were any negative side-effects observed.

In another study, Whitman, Hurley, Johnson & Christian (1978) investigated both the effects and side-effects of treatment with a 10 year old retardate. The subject's mother applied brief physical restraint to modify the child's undesirable responses in an institutional school setting.

Verbal praise and juice were provided to reinforce direction-following behaviors in an academic training situation. Three additional negative behaviors were identified, but not treated. Instead, these behaviors were observed to determine their relationship to the changes in the target behaviors over the course of the study. The results showed that the treatment procedures were effective in increasing direction-following, and in decreasing the non-compliance responses of the child. Additionally, it was shown that several untreated behaviors tended to vary in direct relation to the target behavior, non-compliance. That is, as the non-compliance was decreased, aggression and clothes stripping behaviors also tended to decrease slightly in frequency. Although these changes were systematic, the magnitude of these behaviors prior to intervention was very small. A third behavior, inappropriate vocalizations, increased from 43% to 53% during treatment.

This study represents the most recent attempt to correlate changes in untreated behaviors with the main effects of behavioral intervention techniques. Even though the results were inconclusive, the report was indicative of an interest in the study of side-effects of behavior modification treatments.

Summary

Overcorrection appears to represent a relatively effective procedure for treating self-stimulatory target behaviors in autistic and retarded children and adults. Some evidence has been presented to indicate that decreases in self-stimulatory behaviors are related to the acquisition of adaptive behaviors (Bucher & Lovaas, 1968; Koegel & Covert, 1972; Wells et al., 1977).

In terms of behavioral side-effects, positive behavioral correlates may increase as a result of overcorrection treatment (Bucher & Lovaas, 1968; Epstein et al., 1974; Lovaas & Simmons, 1969). However, no research has shown overcorrection to be detrimental to previously desirable behavior.

Conversely, some studies (Corte et al., 1971; Epstein et al., 1974; Rollings et al., 1977) have reported increases in negative behavioral correlates simultaneous with decreases in self-stimulatory target behavior. To date, no studies have systematically investigated whether other negative collateral behaviors tend to decrease in frequency when the self-stimulatory target behavior is diminished using overcorrection procedures.

Generalization Effects of Overcorrection

The generalization of suppression effects of target self-stimulatory behavior has been discussed by several researchers. Baumeister and Rollings (1976) reported that electric shock, and isolation procedures have resulted in suppression effects which are highly specific to the training setting, and to the person applying the treatment. This finding has been confirmed by Lovaas and Simmons (1969) who contended that subjects are capable of making sharp discriminations with respect to the shock contingency.

Studying the suppression effects of overcorrection, Foxx and Azrin (1973) reported no generalization from the training situation to the home environment. When overcorrection was applied in new environments, self-stimulatory behaviors were also suppressed in those settings.

In two studies (Newman et al., 1977; Simpson & Sasso, in press) using overcorrection in public school classrooms, no generalization of effects to home settings was reported. Suppression effects were achieved however, when the same procedures were applied in the homes. Data from both environments were not presented.

Rollings et al. (1977) found that functional movement overcorrection effectively decelerated body-rocking from 45 responses per minute to almost zero in one retardate. However, for this subject, suppression of the target be-

havior did not occur outside of the training sessions to other localities. Doke and Epstein (1975) added that the effects of overcorrection did not generalize to other periods of the day.

Several studies using overcorrection procedures have reported success in achieving suppression effects across situations. Rusch, Close, Hops, and Agosta (1976) contended that positive practice and verbal reprimand procedures resulted in complete suppression across two separate time periods within the day. These results were reported within the same physical location, a group-living home for adolescent males. It was speculated that the similarity of the contextual stimuli (physical surroundings) facilitated the generalization of suppression effects across environments and time periods. Barnard et al. (1974) reported successful generalization of suppression effects across environments and time. When overcorrection for mouthing was effectively applied in the home, mouthing decreased markedly at school. Without directly applying overcorrection at school, mouthing decreased from an average of 26 to 2 percent. In another study, Simpson and Swenson (1978) investigated the effects of overcorrection procedures across school and home settings. Oral hygiene overcorrection procedures were used in the school environment to eliminate rumination behavior. It was found that corresponding reductions occurred simultaneously in the home setting. The authors concluded that the

intense punishing effects of the overcorrection procedures were responsible for the generalization of suppression effects across environments.

Summary

According to Baumeister and Rollings (1976), generalization typically does not occur spontaneously and must therefore be deliberated and systematically programmed. However, studies using overcorrection procedures have shown that generalization has occurred across settings (Barnard et al., 1974; Simpson & Swenson, 1978), and across time periods (Rusch et al., 1976). This evidence is encouraging, but it does not demonstrate a concrete behavioral phenomenon. More research is required to either disprove, or validate these findings.

Summary

The literature dealing with treatment for self-stimulatory behavior has reported a number of varied techniques. Until the early 1970's, one of the only reported effective procedures available was electric shock. However, the development of overcorrection procedures has offered a more palatable, yet equally effective solution to the treatment of self-stimulatory behavior.

Self-stimulatory behavior (body-rocking, mouthing, and hand-flapping), and self-injurious behavior (head-banging, finger-chewing) have been successfully treated using overcorrection procedures. Additionally, the mentally retarded, autistic, and psychotic have been treated in environments such as institutions, clinic schools, public schools, and the home.

Overcorrection treatment has been associated with various side-effects. However, these reports have shown inconsistent findings. For example, decreases in the self-stimulatory target behavior have been associated with increases in other undesirable behaviors. But in more cases, increases in desirable, adaptive behaviors have been reported as a function of overcorrection treatment for self-stimulatory behavior. Similarly, generalization of suppression effects has been observed, though infrequently in the literature.

Two major areas of inquiry have yet to be evaluated in research using overcorrection. The first is concerned with the extension of overcorrection procedures to new behaviors, to new environments, and with its application by non-professionals such as parents. The second area of inquiry concerns the positive and negative behavioral side-effects of overcorrection treatment for self-stimulatory behavior. Of specific interest are two empirical questions: Will positive correlates increase in frequency as self-

stimulatory target behavior decreases?; and Will other negative behaviors show decreases corresponding to those of the treated self-stimulatory stereotypes.

CHAPTER III

METHODS AND PROCEDURES

The purpose of the present study was to investigate the use of various overcorrection procedures applied to self-stimulatory behaviors by parents with their own severely emotionally disturbed children in natural home settings. In addition, changes in untreated behaviors were systematically recorded and analyzed. Specifically, changes in pinpointed positive and negative behavioral correlates, as well as those for the target self-stimulatory behaviors, were statistically evaluated.

Subjects and Settings

Four males, ranging in age from 5.9 to 10.7 years (mean age 8.3 years) served as subjects. All subjects were enrolled in the primary level classroom of a federally sponsored demonstration project, located at an elementary school in a large midwestern city. The project is designed to serve the educational and social needs of severely emotionally disturbed school-aged pupils.

The purposes of the project are (a) to serve the needs of non-residentially placed emotionally disturbed

children who cannot be easily integrated into existing facilities for the behaviorally disordered because of the severity of their handicapping condition; (b) to provide a model program for demonstrating procedures found to be effective with severely emotionally disturbed children; and (c) to disseminate procedures found to be effective with severely emotionally disturbed children in such a manner that they can be implemented and replicated with similar populations in other geographical areas.

Three of the subjects lived with their natural parents and siblings, while one lived with his aunt (legal guardian), and her family. All of the families resided in a 4 square mile inner-city district of a large midwestern city. The families varied from lower to middle socio-economic and income status. All parents had attained at least a 12th grade education and one parent had attended the first year of junior college. One of the parents was divorced, while three of the children had two parents in the home. Of the two-parent families, the average length of marriage was 16.3 years. Two of the subjects lived with other handicapped siblings.

Prior to this investigation, the families had each been engaged in behavior change training programs for varying lengths of time. The training was offerred as a part of the federally sponsored demonstration project. Several of the families had previously employed some of the procedures used

in this study. However, the specific overcorrection interventions were novel to both parents and subjects. All interventions as described later in this chapter were employed by the parents in the home settings.

Each child was examined psychiatrically by independent mental health agencies and subsequently declared "severely emotionally disturbed" prior to entering the program. Most of the children had been evaluated more than once. Consequently and inevitably, each child had been associated with several different diagnostic labels (e.g., childhood schizophrenia, autism, and psychosis). Notwithstanding the disagreement regarding specific pathology, each child's primary handicap was severe emotional disturbance with associated "functional mental retardation' as a secondary handicapping condition. The label, 'functional mental retardation', was assigned because each child was found to be functioning in a retarded fashion in addition to having severe language deficits and social behavior problems.

Individual descriptions for each of the four subjects are provided below:

Subject 1

Subject 1 was a 10 year, 8 month old male, with little functional language. He was diagnosed as severely emotionally disturbed and mentally retarded as a young child. He lived

with both of his natural parents and one brother, who was also severely handicapped.

At home and at school, he frequently engaged in screaming, non-compliance, and object-rolling behavior which were incompatible with on-task academic performance and productive activity in either environment. On the Vineland Scale of Social Maturity (revised edition, Doll, 1965), he obtained a Social Age of 3.3 years, and a Social Quotient of 31.

Subject 2

Subject 2 was a 6 year old male who was diagnosed as severely emotionally disturbed and mentally retarded. He also had several physical deficits, including a hearing loss and esotropic vision. He lived with his mother and a brother, who was also handicapped.

Historically, this child exhibited numerous self-stimulatory and self-injurious behaviors such as body-rocking and hand-wringing. Frequently his hand-wringing behavior resulted in infected cuticles on several fingers. Since he often rubbed his eyes, infections in both eyes also developed. On the Vineland Scale of Social Maturity, he achieved a Social Age of 3.2 years, and Social Quotient of 52.

Subject 3

At the age of 2½-years, this 8 year, 3 month old male was diagnosed as being "childhood schizophrenic" with associated functional retardation. In addition to being totally non-verbal, he frequently emitted numerous self-stimulatory behaviors such as hand-flapping, pacing, and object-spinning.

He lived with his aunt (legal guardian), her husband and an 11 year old cousin. His uncle was a factory worker and his aunt was a house-wife and part-time cateror. On the Vineland Scale of Social Maturity, he obtained a Social Age of 4.7, and a Social Quotient of 55.

Subject 4

Subject 4 was an 8 year, 3 month old male, who was diagnosed as "childhood schizophrenic". He lived with both natural parents and his six siblings (three brothers and three sisters). He was the youngest child; his siblings ranged in age from 10 to 18 years. Both parents worked in factory settings.

After having developed normally for the first 2½-years of life, this child suddenly lost nearly all of his language, self-help skills, and socialization abilities. In turn, he developed numerous bizarre behaviors, such as echolalia, repetitive verbalizations, body spinning, jumping,

and knuckle-biting. In recent years, however, he developed some functional speech, self-help and socialization skills. He obtained a Social Age of 6.5 and a Social Quotient of 76 on the Vineland Scale of Social Maturity.

Experimental Design

All overcorrection interventions were implemented within a research design known as an A-B-A-B, or intra-subject replication technique (Baer, Wolf, & Risley, 1968). Glass, Willson and Gottman (1975) referred to this as a multiple interrupted time-series design. It involved the use of two baseline periods, separated by two intervention conditions. It is frequently used in applied field research and is regarded as appropriate for studying the unique problems involved in measuring human behavior (Dukes, 1965). In this study, a trained, independent observer was responsible for the collection of all data used in the statistical evaluation of all hypotheses. All procedures were implemented on the same dates through the study.

Procedures

The four subjects and their parents were selected from the primary level classroom of the Severe Personal Adjustment Project. Their selection was based upon two factors. First, each subject displayed several self-

stimulatory behaviors with relatively high frequencies. Second, the subjects' parents demonstrated a willingness to participate in the study. Their commitment was solicited only after the procedural structure of the study was explained and all questions from the parents were answered. The information given to the parents is shown in Appendix A.

The study was designed to last for 50 data collection days. Since observations were obtained only on weekdays, a total of 10 consecutive weeks were required. Although data were not collected on weekend days, the parents were instructed to continue applying the procedures during the overcorrection treatment conditions.

Description of Baseline and Overcorrection Conditions

The following provides a description of the baseline and experimental conditions involved in the study.

Baseline 1: The first baseline condition extended for 15 weekdays for all subjects. Both target behaviors and behavioral correlates were observed under free operant conditions in which natural contingencies operated. No experimental manipulations were attempted during this condition.

Treatment 1: The first overcorrection treatment condition lasted 15 weekdays. Continuous measurement of all behaviors was maintained while specific overcorrection procedures were systematically employed by the parents in an

attempt to change the self-stimulatory target behaviors.

Baseline 2: To control for the effects of maturation, chance, and uncontrolled variables which might account for any behavior changes observed during treatment conditions, the baseline conditions were re-established. The "reversal of conditions" was accomplished by several means.. First, the parents were asked to discontinue the overcorrection procedures, and to remove from the children's sight all physical stimuli representing treatment (e.g., timers, written plans, mouthwash, etc.). Next, the parents were reminded of their previous and predominate modes of dealing with the target behaviors prior to the treatment phase of the study. They were also instructed by the observer, as needed, each day during this condition to react as they did in the initial baseline. No empirical data were obtained on the reliability of parents' approximations to their initial baseline behaviors. However, two separate observers did reach agreement that the parents behaved similarily during both baseline conditions. The baseline 2 condition lasted for 5 weekdays.

Treatment 2: Following the second baseline period, overcorrection treatment procedures were again established and extended for an additional 15 weekdays. This was done for two reasons. First, this allowed for intra-subject replication of experimental procedures, and secondly, it re-established stimulus control over the various self-

stimulatory target behaviors.

Self-Stimulatory Target Behaviors

In this study, the self-stimulatory target behaviors were (a) object-rolling; (b) hand-wringing; (c) hand-flapping; and (d) repetitive verbalizations. Operational definitions for each of these self-stimulatory behaviors are presented below.

Subject 1: Object-rolling was operationally defined as the methodical, rhythmical movement of object with the fingers or palm of one or both hands so that the object maintained direct contact with a solid surface, such as the floor, table, or other surface.

Subject 2: Hand-wringing was operationally defined as the clasping, moving, rubbing, and/or touching of fingers on both hands. This target behavior could occur even though an object was present in the subject's hand or while his fingers were in or near his mouth.

Subject 3: Hand-flapping was operationally defined as the rapid, back-and-forth movement of one or both hands at the wrist(s). This target behavior occasionally occurred while the hands were either touching the face, holding an object, or in direct contact with each other.

Subject 4: Repetitive verbalizations were operationally defined as audible sounds or words (e.g., 'ding', 'bah',

'boop', and 'bing', etc.) that were vocalized outside the context of conversations and which were unintelligible.

Behavioral Correlates

Three positive and three negative aspects of each child's behavior were identified and observed concurrently with the target behavior throughout all conditions of the A-B-A-B design. No overcorrection precedures or other intervention techniques were applied to these behaviors. Instead, they were observed within a free operant state so that the treatment effects of overcorrection, if any, could be determined.

Prior to the study, each of the participating parents were interviewed and asked to list up to six positive and six negative behaviors exhibited by their children, in addition, to the targeted self-stimulatory behavior. Three positive and three negative behaviors then were selected for each subject.

The same positive behavioral correlates (proximity, playing appropriately, and head-orientation) were identified and operationally defined for the four subjects. Proximity and head-orientation were selected since these variables are requisite to most learning situations. Playing appropriately was chosen as it is typically a deficit skill area for severely handicapped children and was observed to be a

problem with the four subjects involved in this study. Previous studies using overcorrection procedures (Foxx, 1971; Foxx & Azrin, 1973) have reported anecdotally that similar behaviors, although not directly treated, have been changed in desirable directions. Negative behavioral correlates were selected individually for each subject. Typically, the identified negative behavioral correlates occurred at high rates and presented severe management problems to the parents.

By subject, operational definitions of the positive and negative behavioral correlates are provided. Since the positive behavioral correlates for all subjects are identical, they are presented only once.

Subject 1

Positive Behavioral Correlates:

Proximity was operationally defined as the subject being physically within 3 feet of another person, excluding the observer. The child could not be considered "proximate" to others if the parent or other person was applying specified overcorrection procedures to him.

Playing appropriately was operationally defined as the using of toys in a manner consistent with their design, watching television, and engaging in either parallel or cooperative play with other peers or adults.

Head-orientation was operationally defined as the movement of the head and/or eyes so that positional orientation towards another person, in the same room, excluding the observer, occurred.

Negative Behavioral Correlates:

Unintelligible sounds were operationally defined as nonsense syllables and words, and involved screaming, rhythmic humming, and whinning (usually associated with tears). These sounds were vocalized by the child and had to be audible to the observer.

Inappropriate verbalizations were operationally defined as words vocalized by the child which could be clearly heard by the observer and which were inappropriate to the social situation. Words or phrases such as "Shut up", or "No", when used to avoid the performance of ordinary tasks, are examples.

Laughing was operationally defined as vocalized and audible sounds constituting a "chuckle", which were emitted without apparent cause of functional purpose.

Subject 2

Positive Behavioral Correlates: See the operational definitions for proximity, playing appropriately, and head-orientation described for subject 1.

Negative Behavioral Correlates:

Unintelligible sounds were operationally defined as nonsense syllables and words, and involved screaming, rhythmic humming, and whinning (usually associated with tears). These sounds were vocalized by the child and had to be audible to the observer.

Object-spinning was operationally defined as the rapid and rotational movement of one or both hands while holding an object. This behavior was recorded if the object was moved with direct contact on solid surfaces such as tables, beds, walls or floors.

Body-rocking was operationally defined as the rhythmic, back-and-forth and/or side-to-side movement of the torso. This behavior could occur while the child was standing or seated.

Subject 3

Positive Behavioral Correlates: See the operational definitions for proximity, playing appropriately, and head-orientation described for subject 1.

Negative Behavioral Correlates:

Throwing was operationally defined as the movement of a child's hand(s) with an object, so that the object

landed on the wall, or on the floor in a location not vertical from the hand. In other words, the object must have landed away from the child in any direction. Objects dropped from the hand in a vertical line to any surface were not recorded as being thrown. However, objects tossed straight upwards and which landed on this vertical line were considered to be thrown.

Unintelligible sounds were operationally defined as nonsense syllables and words, and involved screaming, rhythmic humming, and whining (usually associated with tears). These sounds were vocalized by the child and had to be audible to the observer.

Object-spinning was operationally defined as the rapid and rotational movement of one or both hands while holding an object. This behavior was recorded if the object was moved with direct contact on solid surfaces such as tables, beds, walls, or floors.

Subject 4

Positive Behavioral Correlates: See the operational definitions for proximity, playing appropriately, and head-orientation described for subject 1.

Negative Behavioral Correlates:

Jumping was operationally defined as the voluntary movement of the body so that the heals of both feet lost direct contact with the floor and then immediately returned again. In some instances, both feet completely lost contact with the floor.

Body-spinning was operationally defined as the voluntary whirling and twirling of the body so that complete or near-complete revolutions (more than 270 degrees) were accomplished. This behavior occurred typically while both feet were in direct contact with the floor.

Object-spinning was operationally defined as the rapid and rotational movement of one or both hands while holding an object. This behavior was recorded if the object was moved into direct contact with solid surfaces such as tables, beds, walls, or floors.

Total Behavioral Correlates

For each subject, additional measurement categories, referred to as the total positive and total negative behavioral correlates, were defined operationally. Each of these categories was an aggregate of the respective group of individual behavioral correlates. These measurements were calculated following each observation session. If one, two, or three of the positive or negative behavioral correlates

occurred within a recording interval, this aggregate of behaviors was marked. Thus, the total positive and total negative behavioral correlates categories for each subject represented how often any of the individual positive and negative behavioral correlates occurred.

Overcorrection Treatment Procedures

Overcorrection treatment procedures were selected and designed in relation to previous research and to the presenting problem behavior. Variations of the well documented overcorrection procedures known as, "functional hand movements" (Foxx, 1971; Foxx & Azrin, 1973), and "oral hygiene" (Barnard et al., 1974; Doke & Epstein, 1975), were employed with the different subjects. The following treatment procedures are described, in detail, according to the subject and target behavior to which they were applied.

Subject 1

When the target behavior, object-rolling, occurred the parent was instructed to approach the child in a matter-of-fact manner and say "Stop moving your hands". The object was removed from the child's possession and a treatment of functional hand movements was applied. This treatment consisted of commands by the parent to place his hands; (a) straight out in front, (b) in the pockets, (c) separated on a table or wall, (d) down at the sides, and (e) straight out

at the sides. Each position was maintained for 15 seconds, totaling a 3 minute exercise. The commands were given in a random order while standing behind the child; manual guidance was used if necessary. Parents were instructed not to show anger or frustration during treatment. Following the treatment procedure the child was encouraged to pursue his previous activity, if appropriate.

Subject 2

When the target behavior, hand-wringing, occurred the parent was instructed to approach the child in a matter-of-fact manner and say "Stop moving your fingers". Any object in the child's hands was removed. If the child brought his fingers into contact with his mouth, a 2 minute oral hygiene procedure was applied. The child was instructed and manually assisted if necessary in brushing his teeth for 1 minute with a mouthwash. He then washed his hands for 30 seconds followed by a 30 second hand massage with lotion.

Following the oral hygiene procedure the child was instructed to perform functional hand movements. If hand-wringing alone occurred, treatment consisted solely of functional hand movements. These consisted of commands to place his hands: (a) straight out in front, (b) in the pockets, (c) separated on a table or wall, (d) down at his sides, and (e) straight out at the sides. Each position was maintained for 15 seconds, totaling a 3 minute exercise. The commands were given in a random order while standing behind the child; manual guidance was used if necessary. Should the target

behavior occur during overcorrection treatment, the entire procedure was re-implemented. For the second application, the parents were advised to use manual guidance, thus preventing the occurrence of the target behavior. The parents were instructed not to show anger or frustration during the treatment. Total time of treatment did not exceed 5 minutes if both phases were used. Following the treatment procedure the child was encouraged to pursue his previous activity, if appropriate.

Subject 3

When the target behavior, hand-flapping, occurred the parent was instructed to approach the child in a matter-of-fact manner and say "Stop moving your hands". A functional hand movement procedure was then applied. This procedure involved verbal commands for the child to place his hands; (a) in the pockets, (b) separated on a table or wall, (c) straight out in front, (d) down at his sides, and (e) straight out at the sides. Each position was maintained for 15 seconds, totaling a 3 minute exercise. The commands were given in a random order while standing behind the child; manual guidance was used if necessary. The parents were instructed not to show anger or frustration during the treatment. Following the treatment procedure the child was encouraged to pursue his previous activity, if appropriate.

Subject 4

When observed to be engaging in self-stimulatory verbal behavior, the subject was treated with the following overcorrection procedure. The adult would approach the child in a matter-of-fact manner, saying "Be quiet". He or she would then apply his/her hand firmly to the subject's mouth in such a manner that noises could not be made and would hold it there for 30 seconds. The treatment, administered by an adult who would stand behind the child while he was sitting or standing, was applied with a neutral temperment. That is, no angry words or actions were used in association with the treatment. At the end of the 30 second period, the adult applying the treatment would say, "Good being quiet" and would then remove the hand from the child's mouth. In the event that the child would attempt to make noises at the end of the 30 second period, the adult's hand would remain over his mouth until he was quiet for at least 5 seconds. At this point, both the child and the adult would be in a position to reinstitute the overcorrection procedure, if needed. Otherwise, the child was encouraged to return to the activity in which he engaged in before the implementation of the overcorrection procedure, if it was appropriate, and not self-stimulatory. Working diagrams of all four overcorrection procedures are found in Appendix B.

Treatment Orientation Procedures for Parents and Children

Near the end of the initial baseline period, overcorrection procedures specific to each child were explained and demonstrated to the parents in their own homes. Following this demonstration, a training session was conducted in which the parents were asked to apply the specific overcorrection procedures to the investigator who simulated the specific self-stimulatory behaviors. Parents were required to achieve proficiency under these simulated conditions before employing the overcorrection procedures with their children. Parents were instructed to perform the specific overcorrection treatments. As many as five trials at each procedure were performed. Proficiency was achieved when a parent was able to perform three consecutive errorless treatments with the investigator serving as a model. Proficiency was achieved by all of the parents with the minimum of difficulty. The investigator and the independent observer watched each of the parents apply the procedures. When mutual agreement that the procedures were correctly implemented, proficiency was declared.

On the first 2 days of each overcorrection treatment condition, the parents and observer explained and demonstrated the procedures to each child. Every effort was taken to have the children physically oriented towards the demonstration. Each procedure w s explained in small, sequential

steps, since most of the children had comprehension deficits.

Instructions to parents were to apply immediately the overcorrection procedures everytime the respective target behaviors were observed. The observer also provided prompts and instructional feedback as needed.

Data Collection Procedures

Data collection on the previously defined dependent variables was conducted for 5 days each week by an independent observer. Although the observer was experienced in general data collection procedures, sessions were conducted prior to the initial baseline condition to train him in interval sampling recording techniques. For this purpose, a video-taped sequence of children displaying various deviant behaviors and an overt behavior interval recording system (Werry & Quay, 1969) were used. The observer was given a list of behavioral definitions to memorize. Following this, the observer and previously trained person simultaneously watched the video-taped sequence on a TV monitor and recorded the behaviors observed. Agreement between observers was calculated by evaluating responses, interval by interval, and dividing the number of agreements by the total number of possible agreements. This was done after each practice session. The training sessions, averaging 45 minutes, were terminated when an agreement coefficient

of 90% or better was achieved for two consecutive observation periods. An average of 96.1 percent agreement was obtained before the training sessions were terminated.

The parents were instructed to observe the occurrence of the respective self-stimulatory target behaviors. This request was made so as to better orient the parents toward the behaviors to which treatment was systematically applied. The parents were not required to provide daily recordings of the target behaviors, however. Nonetheless, of central interest was their ability to observe specific behaviors in a direct, continuous, and consistent manner. Reliability of parental observations was determined via a procedure discussed in a later section of this study.

Observation Instructions

Data were collected using an interval sampling strategy, spanning 15 minutes. Two observation sheets per session were used, covering 60 15-second intervals. Behaviors were observed for the first 10 seconds of each interval, followed by 5 seconds in which the specific behaviors observed were recorded.

The observer would arrive at each parent's home at the appointed times, as determined by pre-arranged appointment schedules. A convenient, strategic, and unobstructed position in each home environment was chosen for conducting observations. Such positions shifted within observation

sessions in order to maintain clear visability of the behavior and the child. Parents were instructed by the observer to maintain their presence, as well, during the observation sessions. During observation periods, the observer did not overtly interact or intervene with the children's behavior, or with the parents. The observer informed the parents of this need to conduct unobstrusive observations. This was done prior to each observation sessions for the first several days, and thereafter as needed.

During treatment conditions, the strategy for observations was altered slightly. The application of specified overcorrection procedures was expected to essentially place the child in a restricted condition. Therefore, when treatment was applied, the observation session was suspended for the duration of the application. Should this stipulation greatly extend the observation period beyond the typical 15 minutes, a period of 10 minutes of observation was used. Observations shortened to 10 minutes occurred only twice during the study.

Reliability Checks

On at least 1 day, randomly determined in advance, during each of the experimental conditions, the observer obtained reliability checks on the observation skills of the parents. These checks were made by recording specified

variables simultaneously with the parents. At the outset of the study, the parents were asked to memorize the respective target behavior definitions, described earlier. An interval recording strategy was described to all parents. Over a 15 minute period, parents were asked to observe the child for 1 minute intervals and then record whether or not the specific target behavior occurred. Since both the observer and the parent would observe simultaneously, the observer would signal the parent by raising his hand at the close of each 1 minute interval. Reliability or interobserver agreement was calculated by determining, interval by interval, the number of agreements divided by the total agreements possible.

Following the same procedure, a second, independent observer obtained reliability checks on the primary observer. In this case, however, the calculation of interobserver agreement was more complicated, since seven data measurements (i.e., all behaviors) were involved. This meant comparing each set of observations, interval by interval, for agreement between the observers. Reliability agreement figures for each behavior were calculated using the ratio of agreements between observers over the total number of agreements possible. All reliability checks were done using the standard 60 interval, 15 minute observation system.

Instruments

Global Behavior Problems

Prior to the beginning of the treatment conditions, attempts were made to obtain global descriptions of the subjects' problem behavior repertoires. For this purpose, the parents were administered the Walker Problem Behavior Identification Checklist (1970).

This checklist is comprised of 50 items, describing overt behaviors. These 50 items describe five categories of behaviors (Acting-out, Withdrawal, Distractability, Disturbed Peer Relations, and Immaturity), and give a general profile of the child's problem behaviors.

Walker (1971) has presented the empirical and statistical foundations for the instrument. Twenty-one teachers rated 534 elementary school-aged children across the 50 stimulus items. The Kuder-Richardson split-half reliability coefficient was .985 with a standard deviation of 10.53 and a standard error of 1.28. Three types of validity (contrasted groups, criterion, and item validity) were also demonstrated for the scale. The results indicated that the scale effectively discriminated between subjects, identified by other means as disturbed or a normal (Walker, 1971).

In order to determine over-all changes in behavior as a function of specific overcorrection treatment for self-stimulatory behavior, the checklist was again administered

following the final treatment conditions. However, due to the nature of the test. it was not evaluated via inferential methods. Instead, descriptive statistics were used to assess the test results.

Hypotheses

The experimental design was the same for each of the four subjects. Changes in seven individual behaviors (one target behavior and six behavioral correlates) were thus evaluated across a similar pattern of conditions. Two additional measurements, (total positive and total negative behavioral correlates) were also included. In total, nine individual hypotheses were tested for each of the four subjects. Therefore, 36 null hypotheses were subjected to statistical analysis.

Subject 1

Hypothesis I: There will be no differences in excess of chance for the self-stimulatory target behavior, object-rolling, between baseline and experimental conditions.

Hypothesis II: There will be no differences in excess of chance for the positive behavioral correlate, proximity, between baseline and experimental conditions.

Hypothesis III: There will be no differences in excess of chance for the positive behavioral correlate,

hand-wringing, between baseline and experimental conditions.

Hypothesis XI: There will be no differences in excess of chance for the positive behavioral correlate, proximity, between baseline and experimental conditions.

Hypothesis XII: There will be no differences in excess of chance for the positive behavioral correlate, playing appropriately, between baseline and experimental conditions.

Hypothesis XIII: There will be no differences in excess of chance for the positive behavioral correlate, head-orientation, between baseline and experimental conditions.

Hypothesis XIV: There will be no differences in excess of chance for the total positive behavioral correlates between baseline and experimental conditions.

Hypothesis XV: There will be no differences in excess of chance for the negative behavioral correlate, unintelligible sounds, between baseline and experimental conditions.

Hypothesis XVI: There will be no differences in excess of chance for the negative behavioral correlate, object-spinning, between baseline and experimental conditions.

Hypothesis XVII: There will be no differences in excess of chance for the negative behavioral correlate, body-rocking, between baseline and experimental conditions.

Hypothesis XVIII: There will be no differences in excess of chance for the total negative behavioral correlates between baseline and experimental conditions.

Subject 3

Hypothesis XIX: There will be no differences in excess of chance for the self-stimulatory target behavior, hand-flapping, between baseline and experimental conditions.

Hypothesis XX: There will be no differences in excess of chance for the positive behavioral correlate, proximity, between baseline and experimental conditions.

Hypothesis XXI: There will be no differences in excess of chance for the positive behavioral correlate, playing appropriately, between baseline and experimental conditions.

Hypothesis XXII: There will be no differences in excess of chance for the positive behavioral correlate, head-orientation, between baseline and experimental conditions.

Hypothesis XXIII: There will be no differences in excess of chance for the total positive behavioral correlates between baseline and experimental conditions.

Hypothesis XXIV: There will be no differences in excess of chance for the negative behavioral correlate, throwing, between baseline and experimental conditions.

Hypothesis XXV: There will be no differences in excess of chance for the negative behavioral correlate,

unintelligible sounds, between baseline and experimental conditions.

Hypothesis XXVI: There will be no differences in excess of chance for the negative behavioral correlate, object-spinning, between baseline and experimental conditions.

Hypothesis XXVII: There will be no differences in excess of chance for the total negative behavioral correlates between baseline and experimental conditions.

Subject 4

Hypothesis XXVIII: There will be no differences in excess of chance for the self-stimulatory target behavior, repetitive verbalizations, between baseline and experimental conditions.

Hypothesis XXIX: There will be no differences in excess of chance for the positive behavioral correlate, proximity, between baseline and experimental conditions.

Hypothesis XXX: There will be no differences in excess of chance for the positive behavioral correlate, playing appropriately, between baseline and experimental conditions.

Hypothesis XXXI: There will be no differences in excess of chance for the positive behavioral correlate, head-orientation, between baseline and experimental conditions.

Hypothesis XXXII: There will be no differences in excess of chance for the total positive behavioral correlates between baseline and experimental conditions.

Hypothesis XXXIII: There will be no differences in excess of chance for the negative behavioral correlate, jumping, between baseline and experimental conditions.

Hypothesis XXXIV: There will be no differences in excess of chance for the negative behavioral correlate, body-spinning, between baseline and experimental conditions.

Hypothesis XXXV: There will be no differences in excess of chance for the negative behavioral correlate, object-spinning, between baseline and experimental conditions.

Hypothesis XXXVI: There will be no differences in excess of chance for the total negative behavioral correlates between baseline and experimental conditions.

Time-Series Data Analysis

Gottman, McFall, and Barnett (1969) have proposed the use of a time-series (TMS) analysis model for testing data in single-subject designs, commonly found in operant research. It was contended that traditional operant methodologies are "frequently inappropriate to research...and are unable to control irrelevant variables and eliminate rival hypotheses" (p. 299). Furthermore, it was maintained that traditional parametric statistical methods of analysis are unsuitable because of reliance on control or contrast

developed by Glass, Willson, and Gottman (1975) was performed via computer assistance. The data for each subject were analyzed using a two stage process. In the first stage, baseline and overcorrection treatment data for each behavior, together with the number of days before and during the intervention were supplied to the computer program "CORREL" (Bower, Padia, & Glass, 1974). The program produced correlograms, and partial autocorrelations for both baseline and treatment data. The correlograms and partial autocorrelations were consulted to identify the analysis models according to the guidelines suggested by Glass et al. (1975).

A time-series model is an equation which relates an observation to the previous history of the series (i.e., a string of data points) in which the observation occurs (Glass et al., 1975). Each model has three components: p (referring to autoregression or dependence of data points), d (indicating the general slope of the data), and q (meaning dependence of data from previous random error). In the second stage of time-series analysis, these three identified parameters of the model, and the original raw data are supplied to the computer program "TSX" (Bower et al., 1974). For the data which has been transformed to eliminate or minimize the effects of dependence, a complete least squares regression analysis was performed. A t statistic was then generated which indicated any differences in the level of data between the two conditions compared. The degrees of freedom were equal to the total number of

observations minus the number of parameters being estimated. An alpha level of .05 was selected, against which all statistical comparisons were assessed.

CHAPTER IV

RESULTS

The purpose of this study was to investigate the effects of various overcorrection procedures applied to self-stimulatory behaviors of severely emotionally disturbed children by parents in home settings. In addition, changes in specified untreated behaviors were systematically observed and analyzed throughout the experiment. Specifically, changes in pinpointed positive and negative behavioral correlates, as well as those changes for the self-stimulatory target behaviors, were evaluated.

Time-series observations (Campbell & Stanley, 1963) were recorded continuously for 10 consecutive weeks. Data on nine behavioral measures were obtained for each subject across a multiple interrupted time-series design (Gottman, 1973). Specifically there was one self-stimulatory target behavior as well as three positive and three negative behavioral correlates. Additionally, two grouped behavioral categories, referred to as total positive and total negative behavioral correlates, were also included in the analysis. Throughout the study, 200 individual observation sessions were conducted, resulting in the collection of over 1600 units of data.

Observer Agreement Checks with Parents

In each experimental condition throughout the study, parents performed reliability checks with the observer on the self-stimulatory target behaviors. On these occasions, the observer would record all specified behaviors using a to 15-second interval recording system. Simultaneously, the parents would observe and record the target behaviors using a 15 1-minute interval recording system. At the end of each minute interval, the observer signaled the parents, who would then record whether the target behavior had occurred during that time frame. Agreement was calculated by comparing both sets of recordings and dividing the number of agreement by the total possible chances for agreement.

Table 1

Observer-Parent Agreement Check Summary (%)

	Experimental Conditions				
Subject	Baseline 1	Overcorrection 1	Baseline 2	Overcorrection 2	Mean
1	100	100	93.3	100	98.3
2	80	100	93.3	100	93.3
3	100	100	53.3	80	83.3
4	80	86.7	66.7	93.3	81.7
$\bar{X}$	90	96.7	76.7	93.3	89.2

Table 1 displays specific mean interobserver agreements for the four parents across all experimental conditions. Values, expressed as percentages, indicate a relatively high

level of observational agreement (ranging from 81.7 to 98.3 percent) across all conditions. Combining all averaged agreements for all four parents revealed a value of 89.2 percent agreement. In the second baseline condition, two of the values were comparatively lower than those of the other parents within the condition, and also lower than those adjacent values for each of these two parents. In similar designs, these differences have been thought to be due to either observer bias, or response definition "drift" (Kratochwill & Wetzel, 1977). An investigation of recordings between the parents and the observer revealed an unsystematic distribution of agreements. That is, the parents did not always score the target behaviors lower or higher than the observer, and visa-versa. On this basis, observer bias was discounted as the source of the disagreement between the observer and the parents.

The other threat to high interobserver agreement, response definition drift, was also examined. Although the parents were continuously reminded of the specific definitions, and also had extensive observation and treatment experience with the target behaviors, this variable could have accounted for the differences observed. This began to appear as the case since interobserver agreements increased markedly for both parents during the next overcorrection treatment condition. Having to apply the overcorrection procedures again probably helped these two parents to focus more closely on the target behaviors.

Although these data are indicative of the reliability of observations conducted with parents, the parent data were not involved in the statistical examination of the over-correction treatment and other variables. Instead, these reliability coefficients relate more directly to the parents' ability to observe, and thus treat the target behaviors of concern.

Interobserver Agreement Checks

Following the procedures described earlier, inter-observer agreement checks were performed between the primary observer and a second observer. Table 2 displays the mean reliability coefficients obtained for the seven identified behaviors (i.e., one self-stimulatory target behavior, and six behavioral correlates) for each of the four subjects.

Agreement coefficients for all 28 individual behaviors averaged 95.0 percent. With the exception of three agreement figures, the range of coefficients varied from 82.8 to 100 percent agreement. Of the three variables (i.e., proximity, playing appropriately, and head-orientation), common to all four subjects, an average of 90.3 percent agreement was obtained across the four experimental conditions. Agreements across subjects ranged from 88 to 92.2 percent.

Most importantly, the factors of observer bias and definitional drift seemed to be relatively minimized given the relatively high reliability coefficients obtained. Response definitional drift and observer bias were somewhat

Table 2

Interobserver Agreement Percentages

Subject	Target Behaviors and Behavioral Correlates							Means
1	Object-rolling	Proximity	Playing appropriately	Head-orientation	Unintelligible sounds	Inappropriate verbalization	Laughing	
	96.7	96.3	95.0	85.4	89.2	91.3	91.7	92.2
2	Hand-wringing	Proximity	Playing appropriately	Head-orientation	Unintelligible sounds	Object-spinning	Body-rocking	
	89.3	92.9	96.3	86.5	78.3	100.0	72.7	88.0
3	Hand-flapping	Proximity	Playing appropriately	Head-orientation	Unintelligible sounds	Object-spinning	Throwing	
	77.7	91.2	96.7	82.8	86.0	95.5	97.0	89.6
4	Repetitive verbalizations	Proximity	Playing appropriately	Head-orientation	Body-spinning	Object-spinning	Jumping	
	86.2	89.0	93.8	78.0	97.8	99.7	98.8	91.7

minimized since the second observer never had access to the data during the study. Also, review of operational definitions for the behaviors was continuous.

Hypothesis Testing

Glass, Willson, and Gottman (1975) recommended an initial inspection of data before employing the rather expensive time-series analysis computer programs developed by Bower et al. (1974). A visual examination of charted data and the summary means for each condition was used to estimate the probability of significant changes between the two conditions being compared. Since there were 36 stated null hypotheses, each of which involved three separate comparisons, a total of 108 *t* tests were possible. Through this screening process, six possible comparisons, or two of the null hypothesis were eliminated, leaving 102 sets of data points to be tested via computer assistance. In one instance, the identified behavior was not observed throughout the study, and hence there was no variability in the data between the conitions to be analyzed. In the other case, the pinpointed behavior occurred infrequently during the first baseline condition and thereafter it was not observed.

Tables 3 through 6 present the results of the computer assisted time-series analyses for the four subjects. Individual hypotheses and corresponding *t* test values for the various comparisons are presented for each subject on each table. The number of degrees of freedom were equal to the

total number of data points minus the number of parameters being estimated. That is, the degrees of freedom (df) were equal to 50 data points less the three dimensions for the time-series model and the grand mean. Therefore, the degrees of freedom were 46 for each of the t tests performed. A two-tailed test of significance was used to evaluate statistical differences. To facilitate the analyses, visual displays for each behavior are also presented. Figures 1 through 36 represent the charted data for these time-series observations.

Subject 1

Hypothesis I sought to determine the statistical differences for the self-stimulatory target behavior, object-rolling, across baseline and experimental conditions. Figure 1 displays the time-series observations for this target behavior across these experimental conditions. Overcorrection (functional hand movements) served to decrease object-rolling behavior from an average of 21.6 percent during the initial baseline to 2.4 percent during the overcorrection 1 condition. A reversal condition (baseline 2) resulted in a return to above baseline 1 mean levels (39%). During the second overcorrection treatment condition, the mean level of object-rolling behavior was decreased to 5.6 percent. Table 3 shows that all three statistical comparisons were highly significant ($p < .05$).

Table 3

Time-series analyses expressed in t test values for changes in nine behavior variables compared across baseline and overcorrection conditions for subject 1.

Behaviors	Statistical Comparisons		
	Baseline 1 vs Overcorrection 1	Overcorrection 1 vs Baseline 2	Baseline 2 vs Overcorrection 2
Object-rolling	-4.29*	+4.73*	-4.29*
Proximity	+1.42	-.86	-.14
Playing appropriately	+3.01*	-2.91*	-.10
Head-orientation	+3.24*	-1.18	-.00
Total positive behavioral correlates	+3.60*	-1.50	-.12
Unintelligible sounds	-1.94	+.26	-1.72
Inappropriate verbalizations	+2.08*	+1.23	-2.92*
Laughing	+.43	+2.13*	-2.13*
Total negative behavioral correlates	+.30	+1.70	-3.40*

* $p < .05$

Hypothesis II examined the differences in the positive behavioral correlate, proximity, as a function of over-

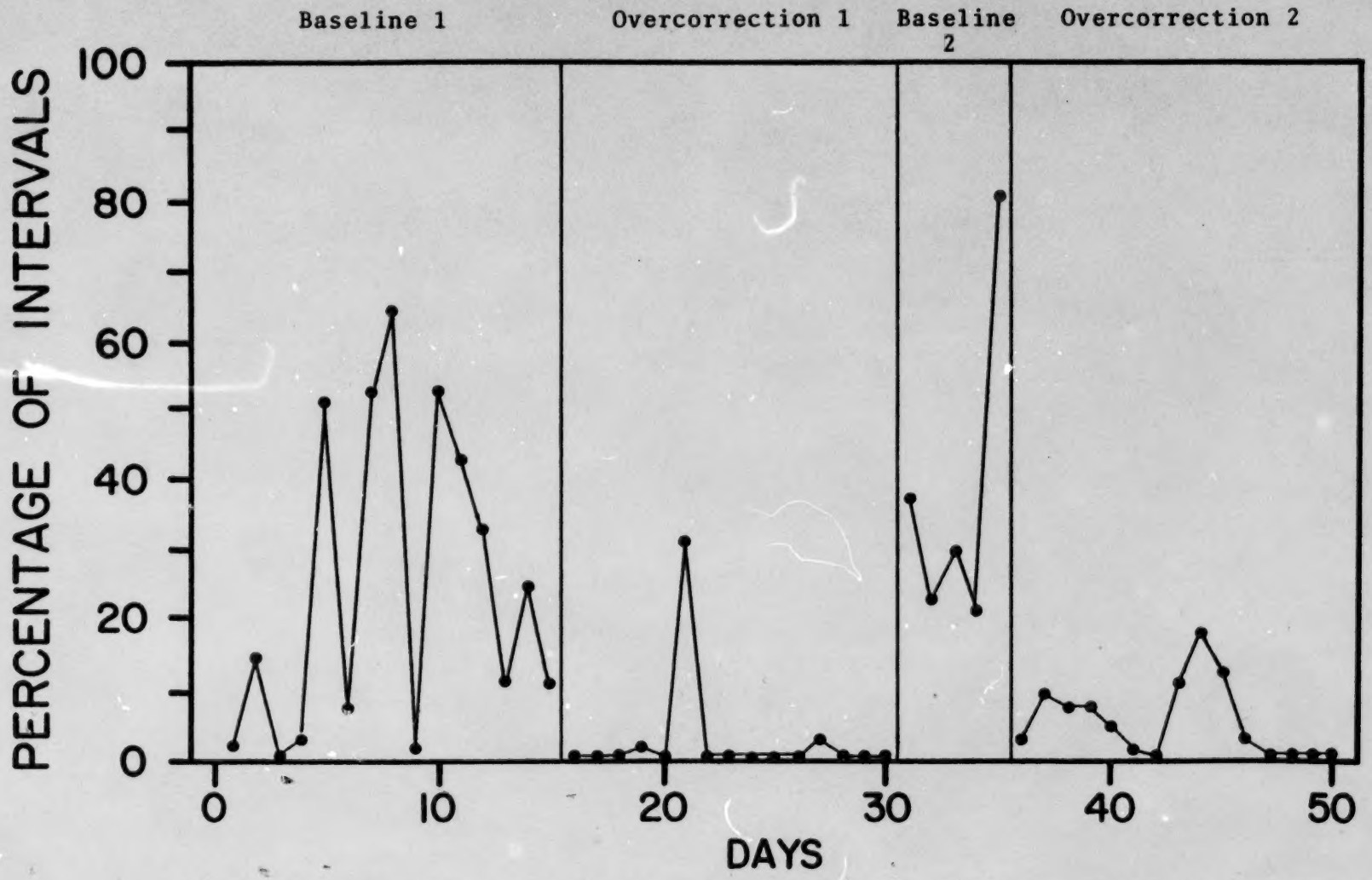

Figure 1. Percentage of the self-stimulatory target behavior, object-rolling, displayed across baseline and overcorrection conditions for subject 1

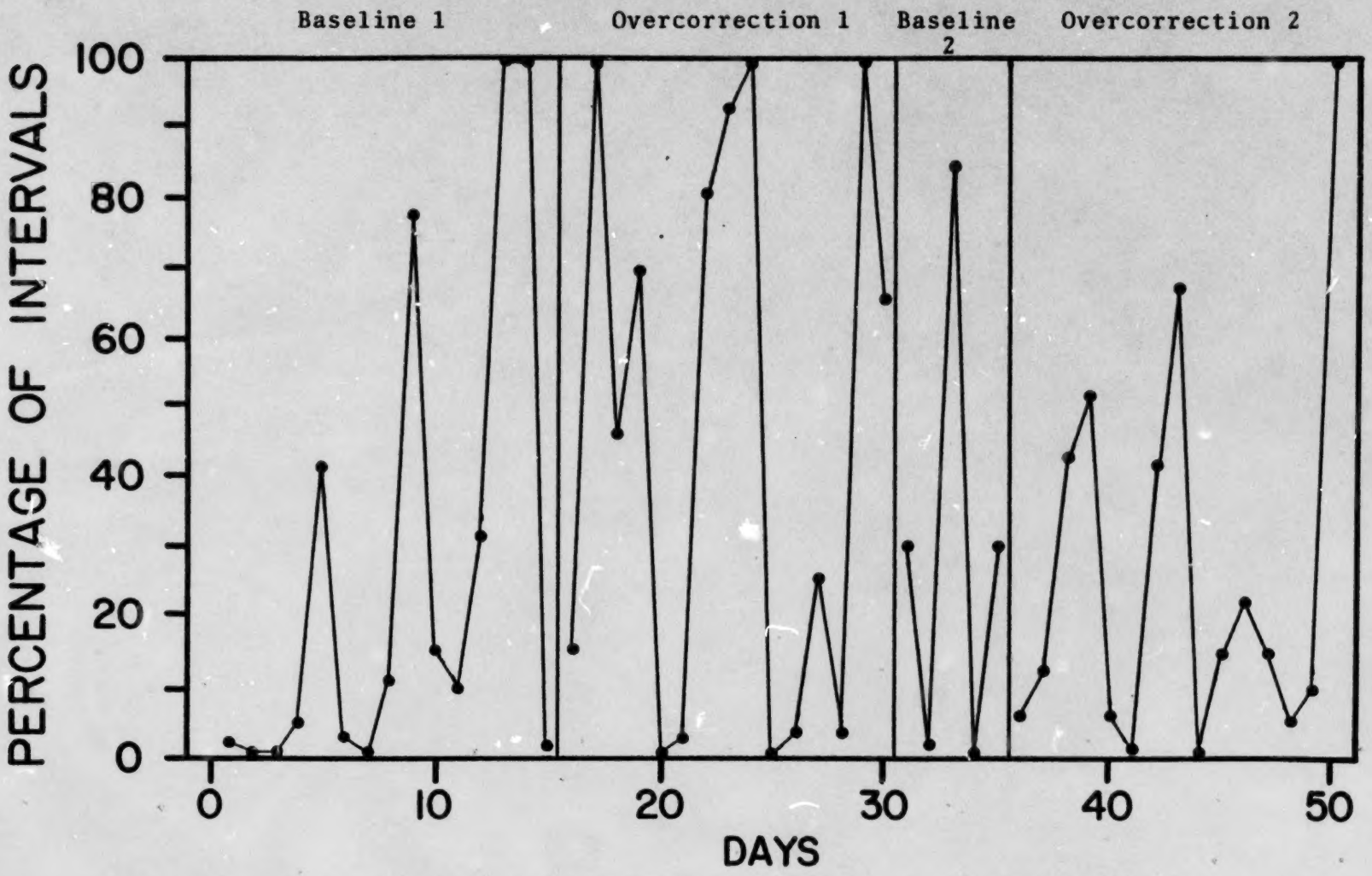

Figure 2. Percentage of the positive behavioral correlate, proximity, displayed across baseline and overcorrection conditions for subject 1

correction treatment. Figure 2 shows the data variations of this behavior across the four experimental conditions. Proximity increased over twenty percentage points from the initial baseline to the overcorrection 1 condition. During the reversal phase, in which the functional hand movement overcorrection treatment was discontinued, proximity returned to the pretreatment level. Re-applying the same overcorrection procedure to the target behavior, however, did not subsequently increase proximity behavior to the overcorrection 1 condition level. Table 3 shows that the time-series analyses for these three comparisons were non-significant ($p>.05$).

Hypothesis III investigated the differences in the positive behavioral correlate, playing appropriately, as a function of the overcorrection procedures. Figure 3 displays the effects of treatment on playing appropriately across the four experimental conditions. During the initial baseline, playing appropriately averaged nearly 8 percent. The application of overcorrection to the target behavior was associated with an average of 19.4% for playing appropriately. Returning to the baseline conditions resulted in a decrease in this positive behavior correlate to a 2.3% level. However, when overcorrection was re-implemented, this behavior failed to increase as in the first treatment period. Table 3 shows that the first comparison was significant ($p<.05$), denoting a marked change from the initial baseline to the first overcorrection treatment condition. Additionally, a significant difference ($p<.05$) was found for changes between

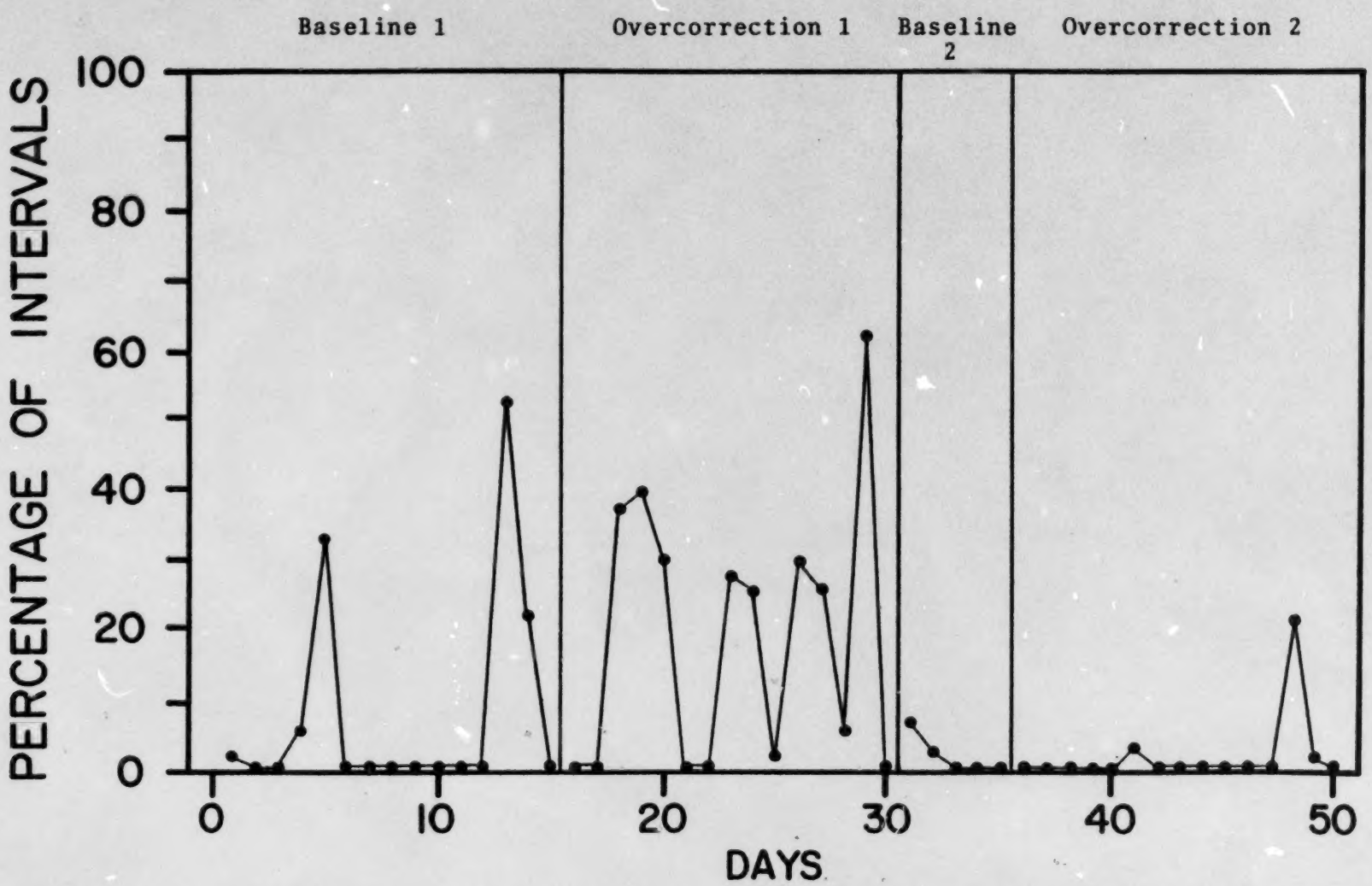

Figure 3. Percentage of the positive behavioral correlate, playing appropriately, displayed across baseline and overcorrection conditions for subject 1

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the first overcorrection condition and the second baseline condition. As Table 3 shows however, there were no significant differences between the second baseline and the overcorrection 2 condition.

Hypothesis IV examined the changes in the positive behavioral correlate, head-orientation, as a function of the overcorrection treatment applied to the target behavior. As Figure 4 illustrates, head-orientation averaged slightly over 13 percent during the first baseline condition. When the overcorrection 1 condition was implemented, head-orientation increased over 50 percentage points to an average of 64.1%. Table 3 supports the fact that this change was highly significant ($p < .05$). Head-orientation was diminished to a mean level of 40% during the return to baseline condition. This level did not vary when the second overcorrection treatment condition was implemented. Although the statistical analysis did not show significant differences across these later condition changes, head-orientation measurement was terminated at a level almost three times that of the first baseline condition.

Hypothesis V dealt with the testing for differences in the general category known as total positive behavioral correlates across the four experimental conditions. Figure 5 shows that the total positive behavioral correlates averaged 28.4% during the baseline 1 condition. When the overcorrection 1 condition was implemented, total positive behavioral correlates increased to an average of 76.8, almost

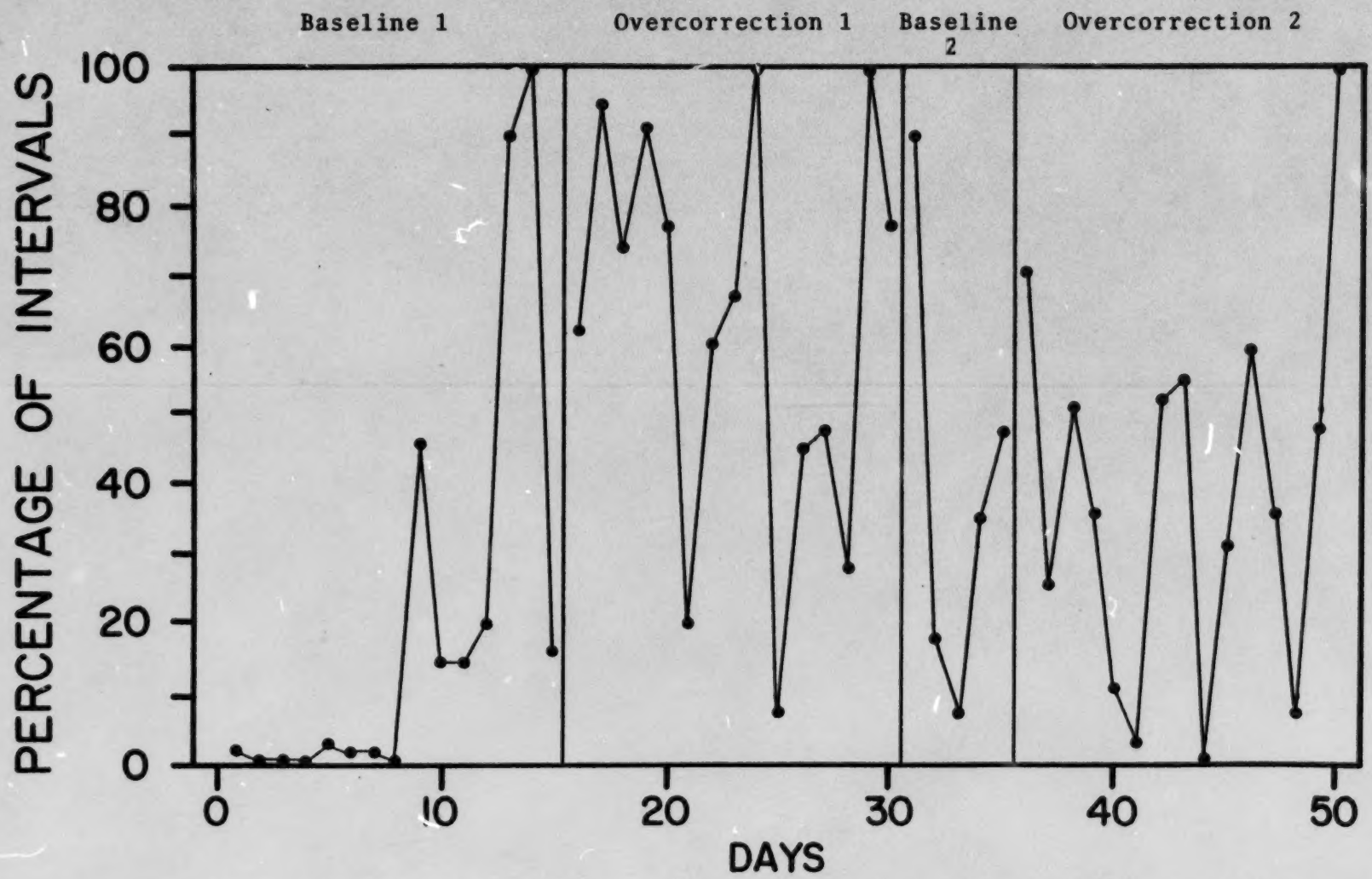

Figure 4. Percentage of the positive behavioral correlate, head-orientation, displayed across baseline and overcorrection conditions for subject 1

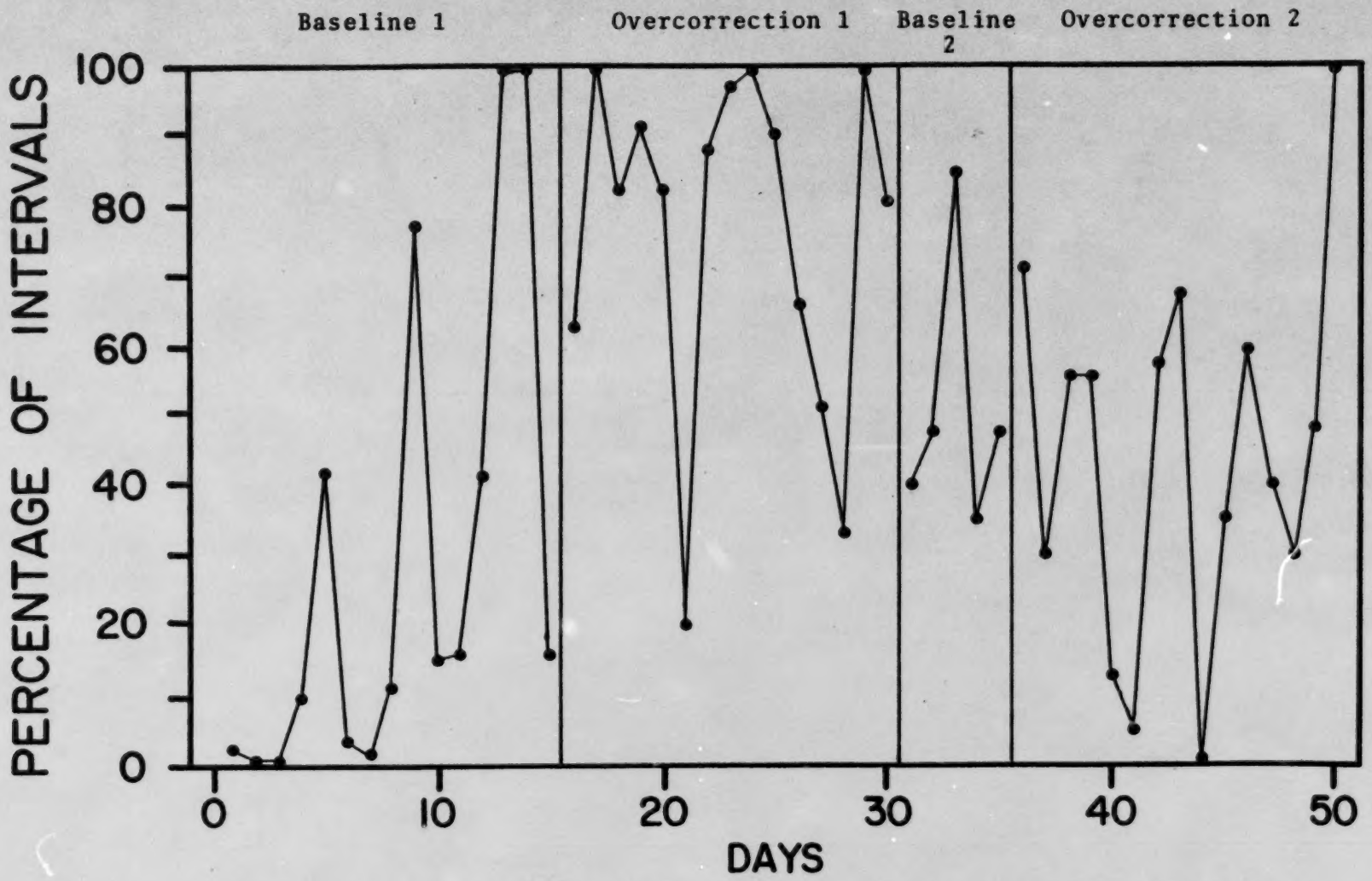

Figure 5. Percentage of the total positive behavioral correlates displayed across baseline and overcorrection conditions for subject 1

50 percentage points higher than the baseline level. This behavioral measure decreased over 25 percentage points to an average level of 51.3% during the baseline 2 conditions. Despite the re-establishment of overcorrection procedures (overcorrection 2), total positive behaviors continued to decrease to an average of 44.9%. As in the case of the head-orientation behavior, this behavior resulted in a net increase over the measured level during the first baseline of nearly 16 percentage points. Accordingly, Table 3 shows that only the first change was significantly different ($p<.05$).

Hypothesis VI sought to determine the relationship between changes in the negative behavioral correlate, unintelligible sounds, and changes in the treated target behavior across the baseline and overcorrection conditions. An inspection of Figure 6 revealed that unintelligible sounds averaged 19.5% during the baseline 1 conditions. With the first application of overcorrection to the target behavior, this negative behavioral correlate decreased to an average of 11.4%. The level of this behavior remained essentially unchanged when the overcorrection procedures were removed. However, then the overcorrection 2 condition was reimplemented, unintelligible sounds further decreased to an average of 5%. Table 3 shows that all of the statistical comparisons between experimental conditions were non-significant ($p>.05$).

Hypothesis VII examined the relationship between the negative behavioral correlate, inappropriate verbalizations,

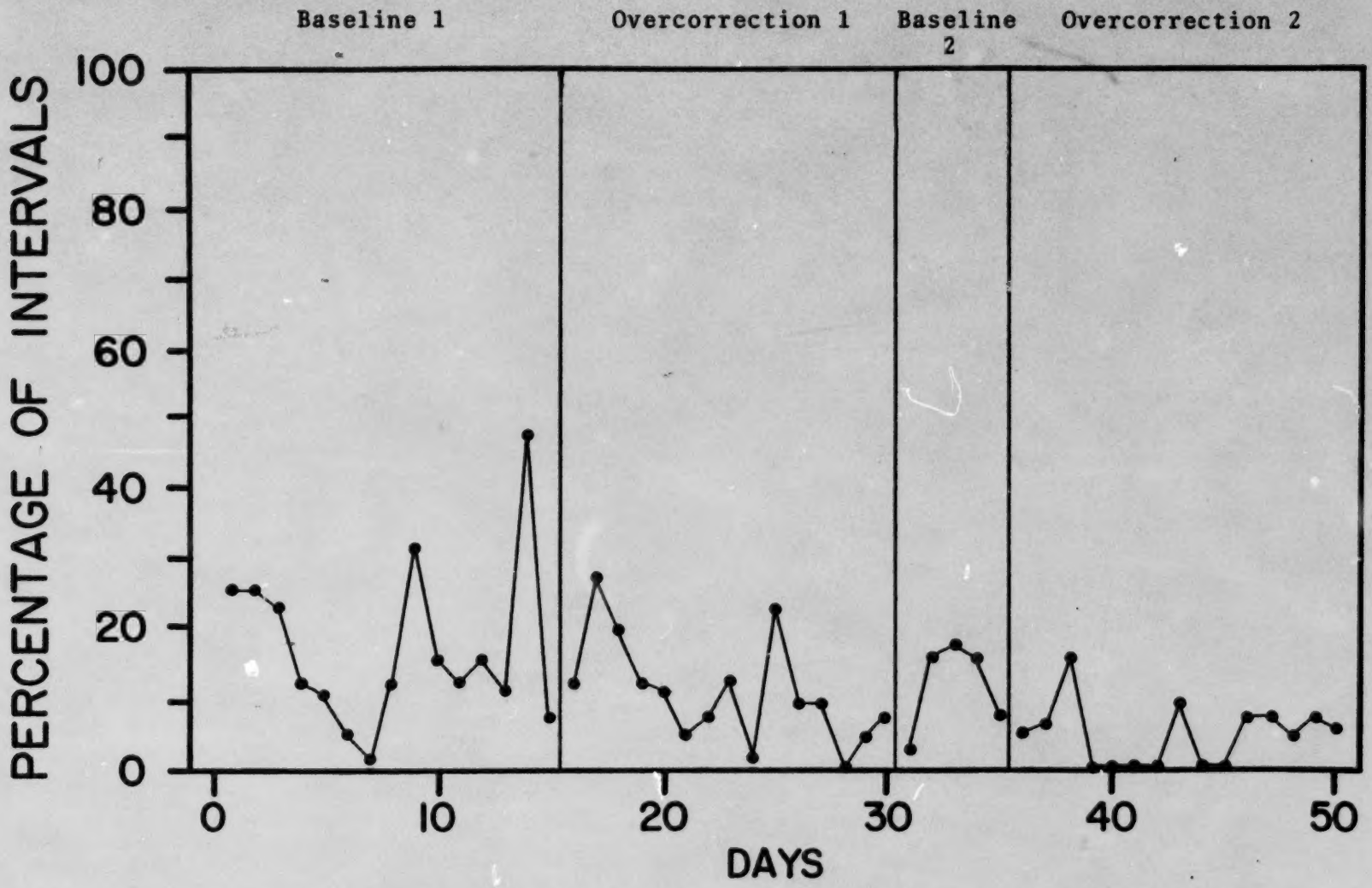

Figure 6. Percentage of the negative behavioral correlate, unintelligible sounds, displayed across baseline and overcorrection conditions for subject 1

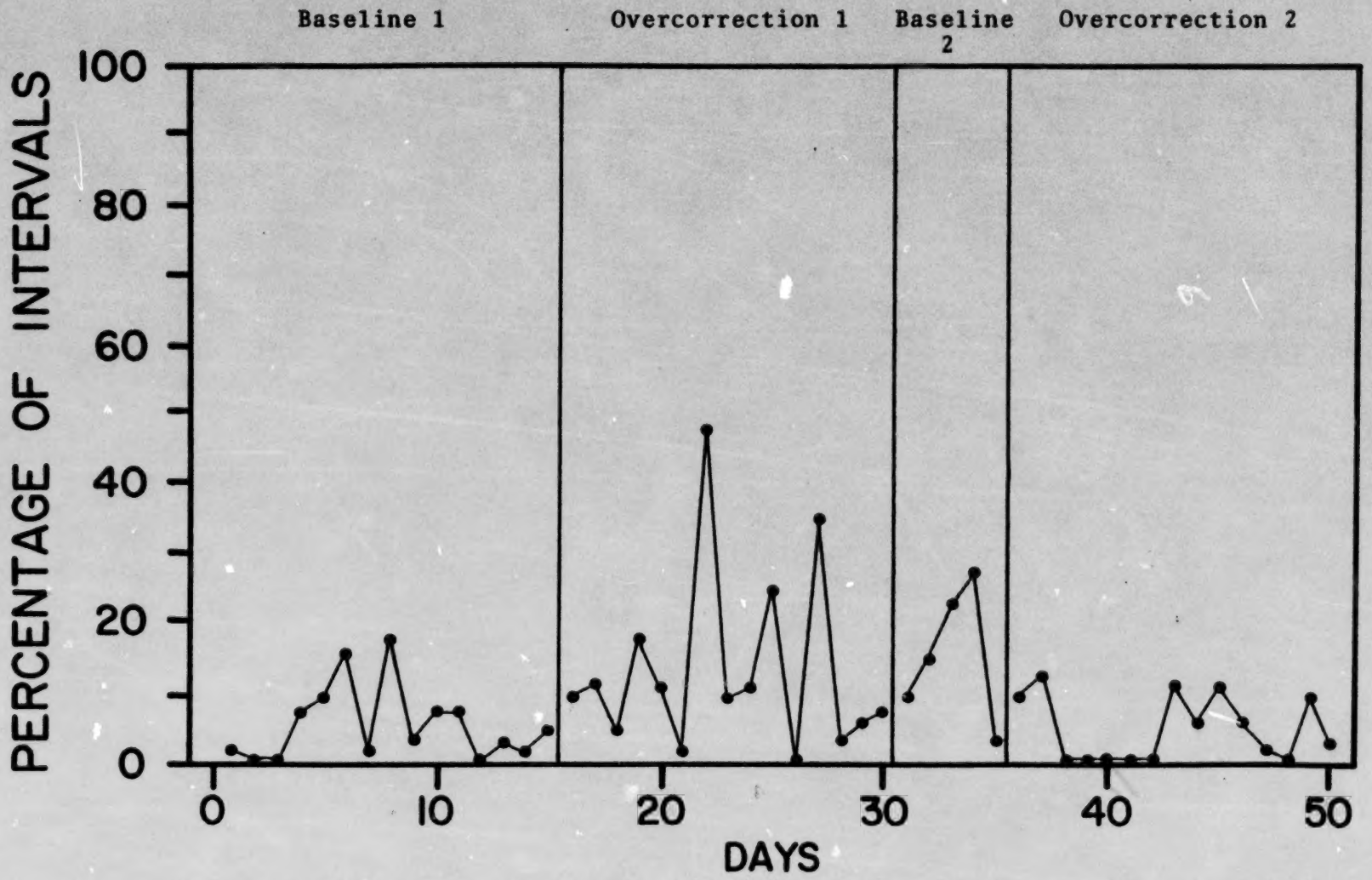

Figure 7. Percentage of the negative behavioral correlate, inappropriate verbalizations displayed across baseline and overcorrection conditions for subject 1

and the target behavior. Figure 7 shows the behavioral changes across the designated experimental conditions. Table 3 shows this negative behavioral correlate increased significantly ($p<.05$) when the overcorrection 1 condition was implemented. Inappropriate verbalizations increased from an average of 5.8% to 13.8%. This behavior continued to increase to an average level of 18% during the baseline 2 condition. When the overcorrection 2 condition was implemented, this negative behavioral correlate decreased to 5%. A time-series analysis of this change showed that significant differences resulted ($p<.05$).

Hypothesis VIII sought to determine the relationship between the negative behavioral correlate, laughing, and the self-stimulatory target behavior. Figure 8 shows the changes across the various experimental conditions for this behavioral correlate. Laughing averaged 8.7% during the first baseline condition. When the overcorrection procedures were applied to the target behavior, this negative behavioral correlate increased slightly to a level of 10.6%. This behavior increased to 24% when baseline conditions were reimplemented. Table 3 reveals that this change was statistically significant ($p< .05$) during the final overcorrection shows that laughing behavior decreased to an average of 9.9%. As noted in Table 3, level was also significantly different ($p< .05$) from the mean of the second baseline condition.

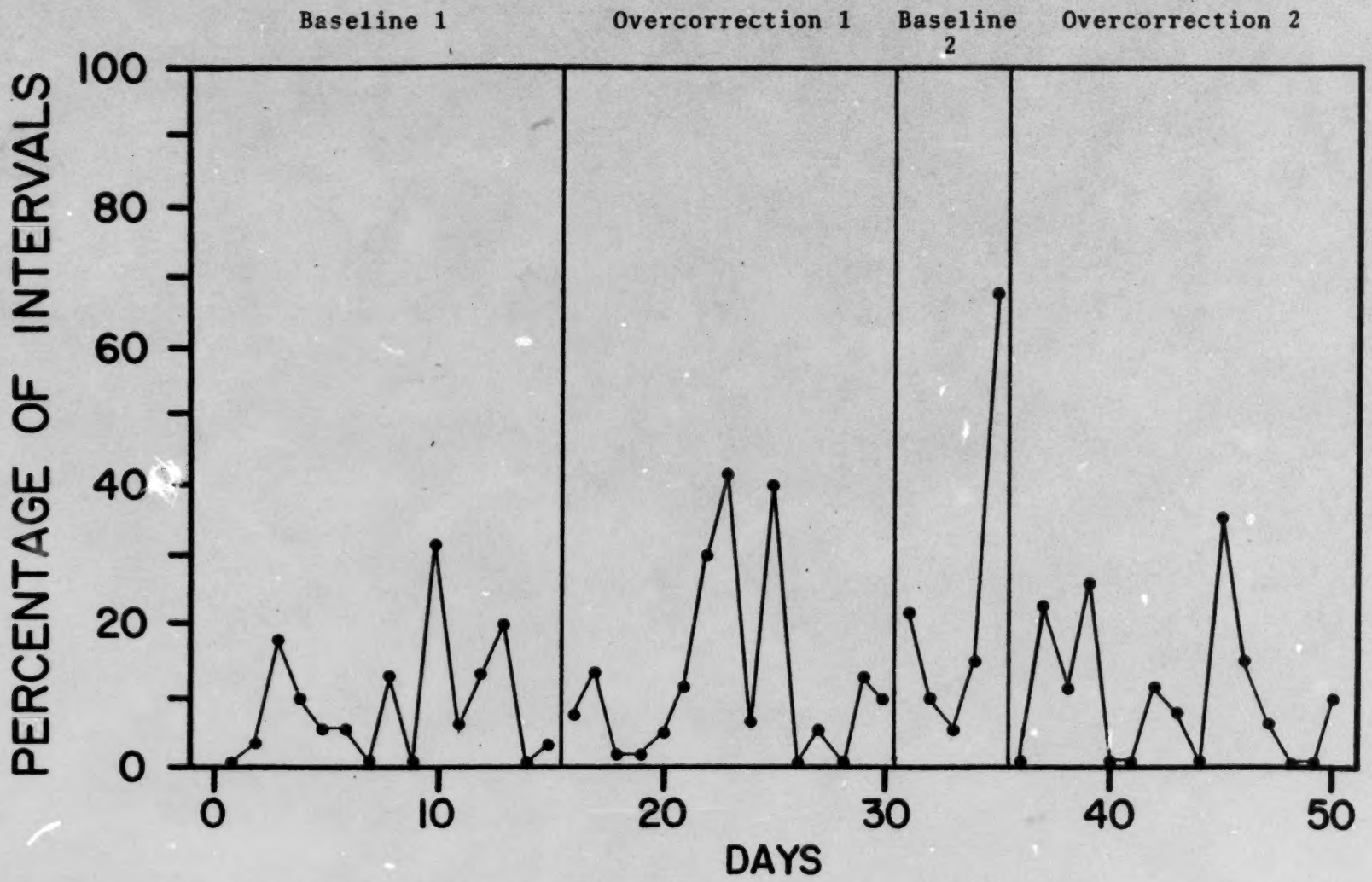

Figure 8. Percentage of the negative behavioral correlate, laughing, displayed across baseline and overcorrection conditions for subject 1

Hypothesis IX sought to determine the relationship between the total negative behavioral correlates and the treated target behavior across the four experimental conditions. Figure 9 shows that this grouped behavioral category averaged 28.8% during the initial baseline condition. As overcorrection was implemented with the target behavior, this behavioral measurement increased to an average of 37.8%, a gain of nearly 10 percentage points. Table 3 shows this increase to be non-significant, however. A reversal to baseline conditions resulted in a further increase of 5 percentage points. The time-series analysis, also showed this change to be non-significant at the .05 level of confidence. However, when the overcorrection 2 condition was implemented, the average level of total negative behavioral cirrelates decreased to 18.2%. A time-series analysis of this change revealed significant differences ($p < .05$), as shown in Table 3. Although increases in this group this behavioral correlate were noted during the first three conditions of the study, an overall decrease 10 percentage points was observed between the first and last experimental condition.

Subject 2

Hypothesis X sought to determine the differences in the self-stimulatory target behavior, hand-wringing, as a function of overcorrection procedures applied across four

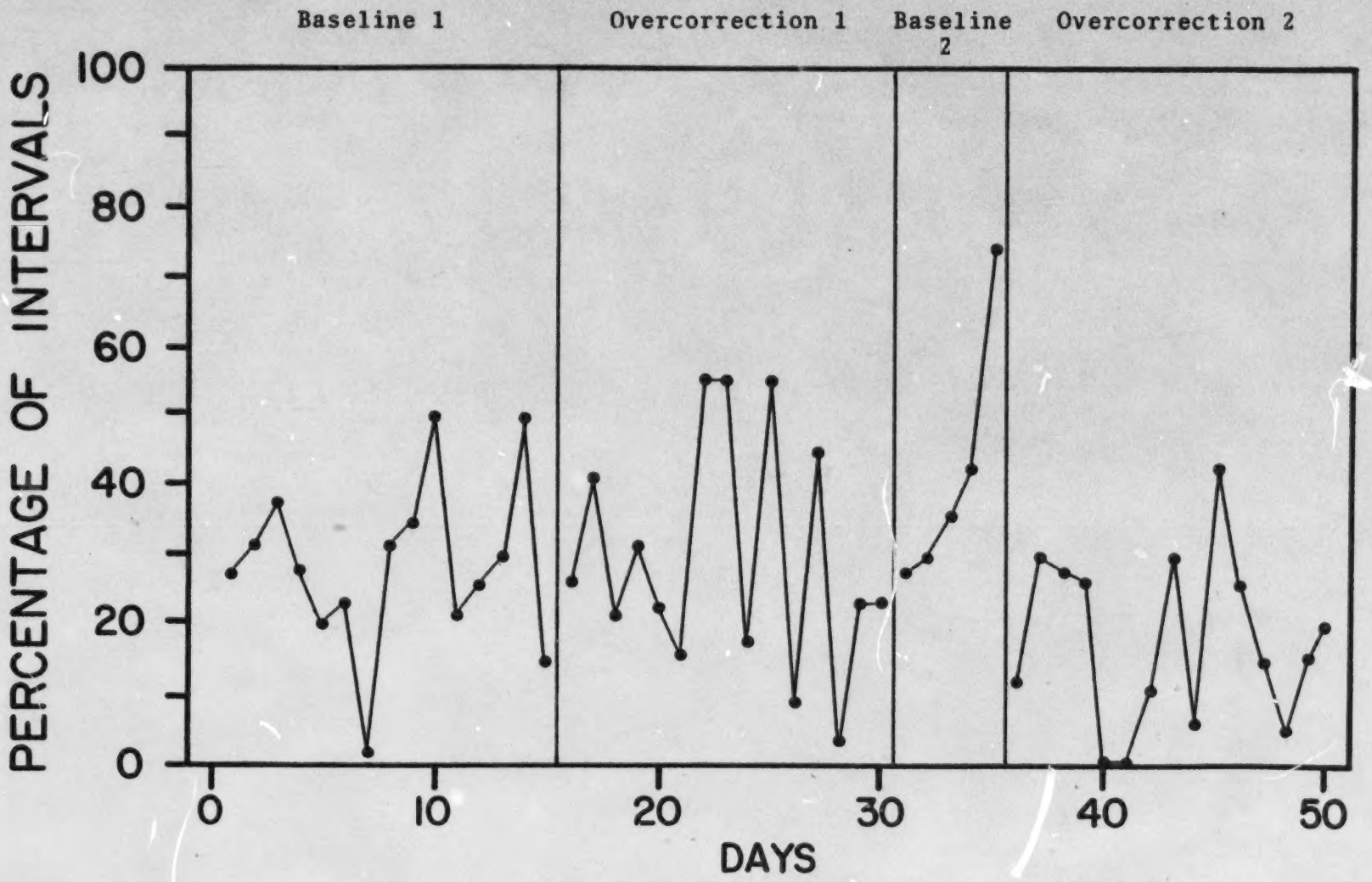

Figure 9. Percentage of the total negative behavioral correlates displayed across baseline and overcorrection conditions for subject 1

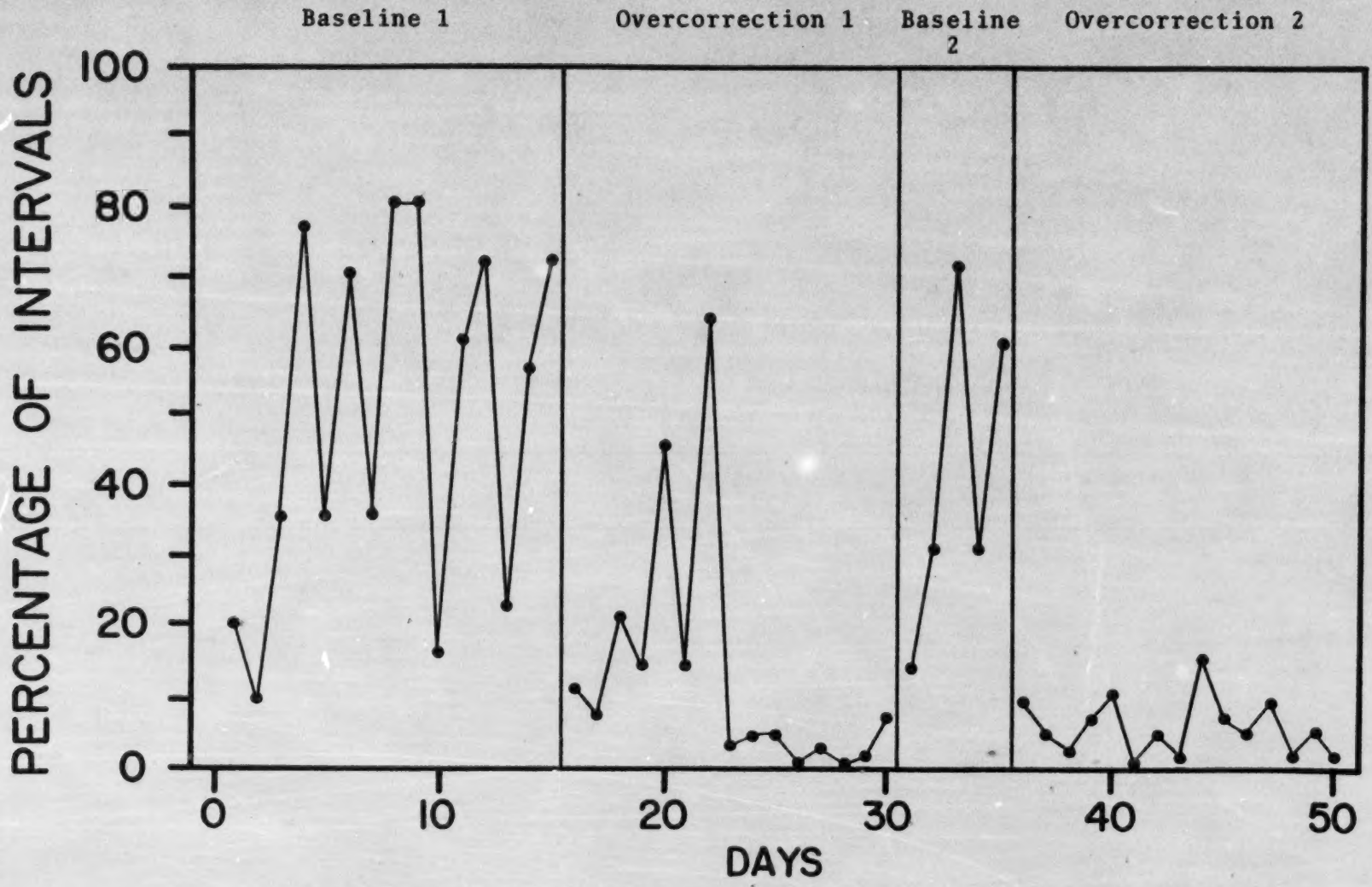

Figure 10. Percentage of the self-stimulatory target behavior, hand-wringing, displayed across baseline and overcorrection conditions for subject 2

experimental conditions. Figure 10 shows that during the initial baseline condition, hand-wringing was measured at an average level of 50.7%. With the implementation of overcorrection procedures, the mean level of this target behavior was 14%, a decrease of over 36 percentage points. Hand-wringing behavior averaged 42.7% during the baseline 2 condition. During the overcorrection 2 condition, this target behavior was decreased to a mean of 6.3%. Table 4 shows that each of the three statistical comparisons between experimental conditions was significant at the .05 level of confidence.

Hypothesis XI examined the differences that occurred in the positive behavioral correlate, proximity, as a function of the overcorrection treatment applied to the target behavior. Figure 11 provides a visual display of the changes across the four experimental conditions. During the initial baseline condition, proximity was measured at an average of 54.7%. When the overcorrection 2 condition was established, the mean level of proximity behavior increased to an average of 83 percent, an increase of almost 30 percentage points. With the implementation of the second baseline condition, a slight increase in proximity was noted (86%). However, when the overcorrection procedures were re-established, the mean level for this positive behavioral correlate decreased to 57%, just three percentage points higher than that recorded during the initial baseline condition. As Table 4 shows the comparisons between the baseline and overcorrection contitions were non-significant ($p > .05$).

Table 4

Time-series analysis expressed in t test values for changes in nine behavior variables compared across baseline and overcorrection conditions for subject 2.

	Statistical Comparisons		
Behaviors	Baseline 1 vs Overcorrection 1	Overcorrection 1 vs Baseline 2	Baseline 2 vs Overcorrection 2
Hand-wringing	-5.57*	+3.06*	-3.88*
Proximity	+1.98	+.26	-1.46
Playing appropriately	+.95	-1.70	+.75
Head-orientation	+3.66*	+.34	-1.60
Total positive behavioral correlates	+1.95	-.10	-.68
Unintelligible sounds	-1.44	+.88	-.87
Object-spinning	----	----	----
Body-rocking	-2.06*	+1.70	-2.15*
Total negative behavioral correlates	-2.08*	+1.48	-1.84

*$p < .05$

Hypothesis XII investigated the changes in the positive behavioral correlate, playing appropriately, as a function of

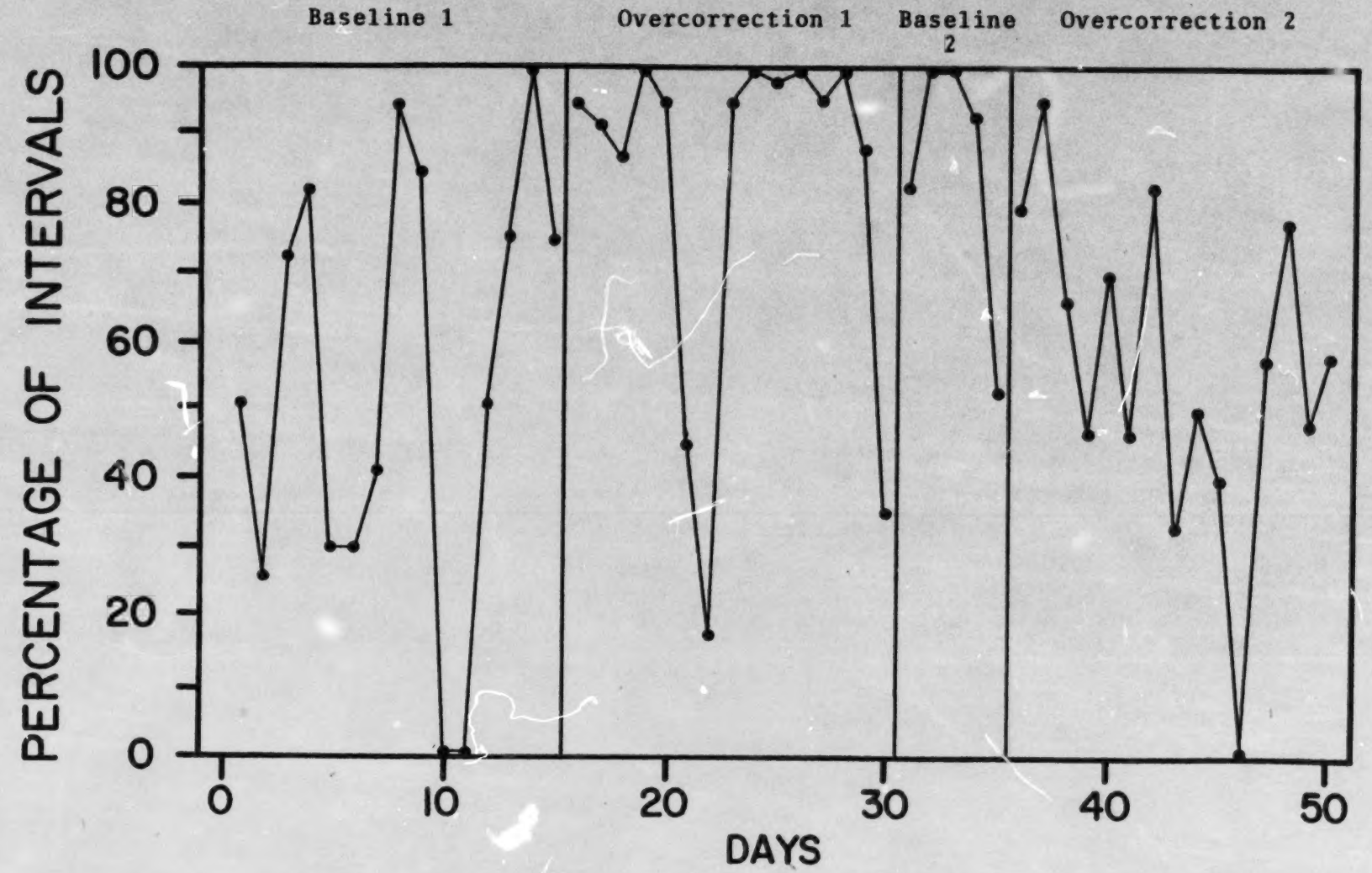

Figure 11. Percentage of the positive behavioral correlate, proximity, displayed across baseline and overcorrection conditions for subject 2

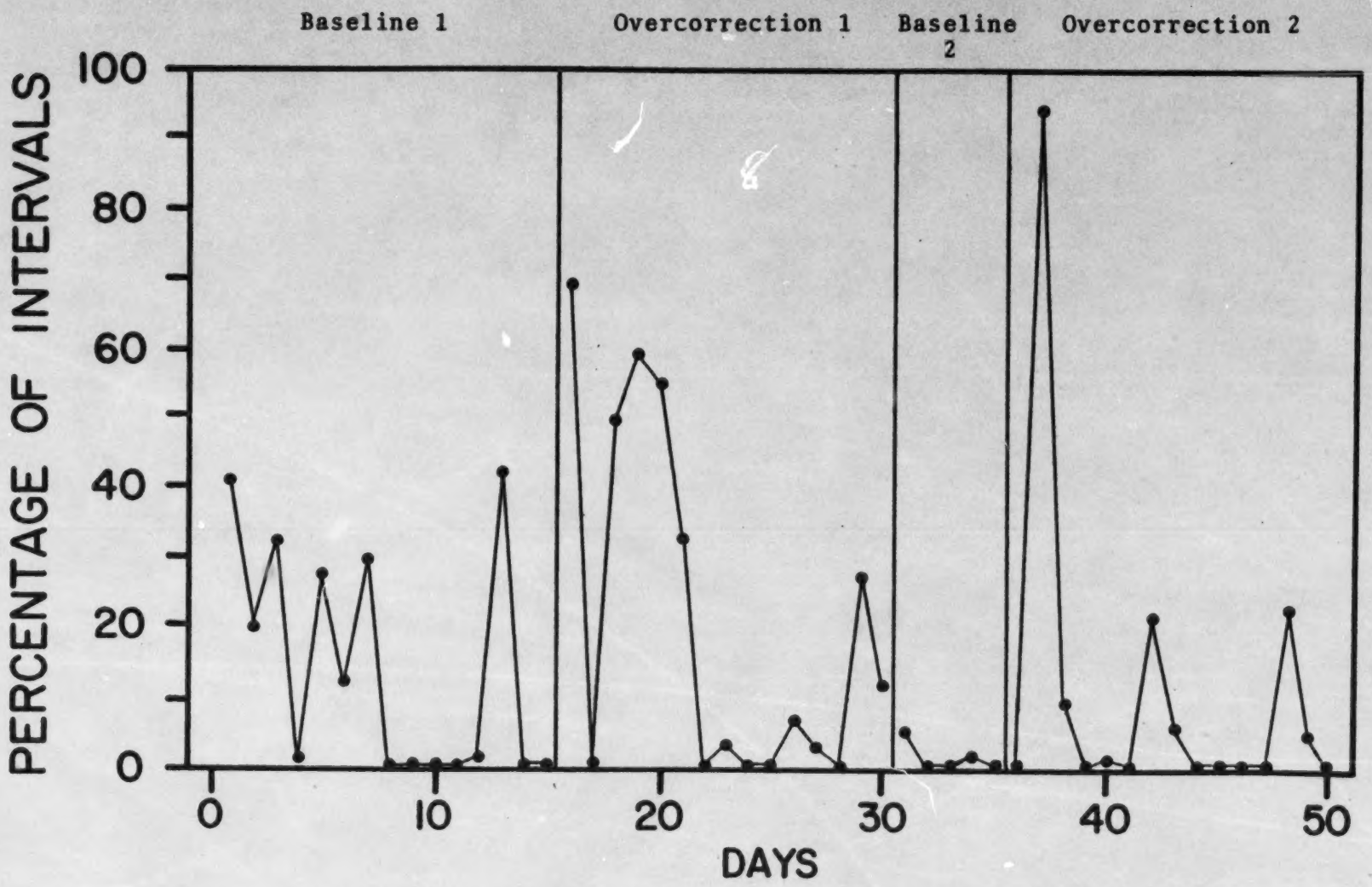

Figure 12. Percentage of the positive behavioral correlate, playing appropriately, displayed across baseline and overcorrection conditions for subject 2

overcorrection applied to the target behavior. As Figure 12 shows, this behavioral correlate averaged 14.2% during the baseline 1 condition. During the first overcorrection treatment condition, playing appropriately increased to a mean of 22.8%. Table 4 shows this increase to be non-significant ($p > .05$). During the second baseline condition, the mean level of playing appropriately dropped to 1.7%, a decrease of over 21 percentage points. Table 4 shows the difference between the overcorrection 1 and baseline 2 conditions also to be statistically non-significant ($p > .05$). When overcorrection was re-applied, the mean level of playing appropriately increased to an average of 10.3%. As revealed in Table 4, this increase was found to be non-significant ($p > .05$). In the final analysis, this positive behavioral correlate decreased nearly four percentage points throughout the course of the experiment.

Hypothesis XIII sought to examine the differences in the positive behavioral correlate, head-orientation, as a function of changes in the target behavior. Figure 13 shows the changes in this behavior visually across the four experimental conditions. During the initial baseline, head-orientation averaged 39.3%. With the introduction of the overcorrection treatment procedures for the target behavior, this behavioral correlate increased to an average of 81.4%. The time-series analysis, in comparing these two means, revealed significant differences associated with the onset of the treatment condition. Head-orientation increased slightly during the second baseline condition to an average of 86.9%.

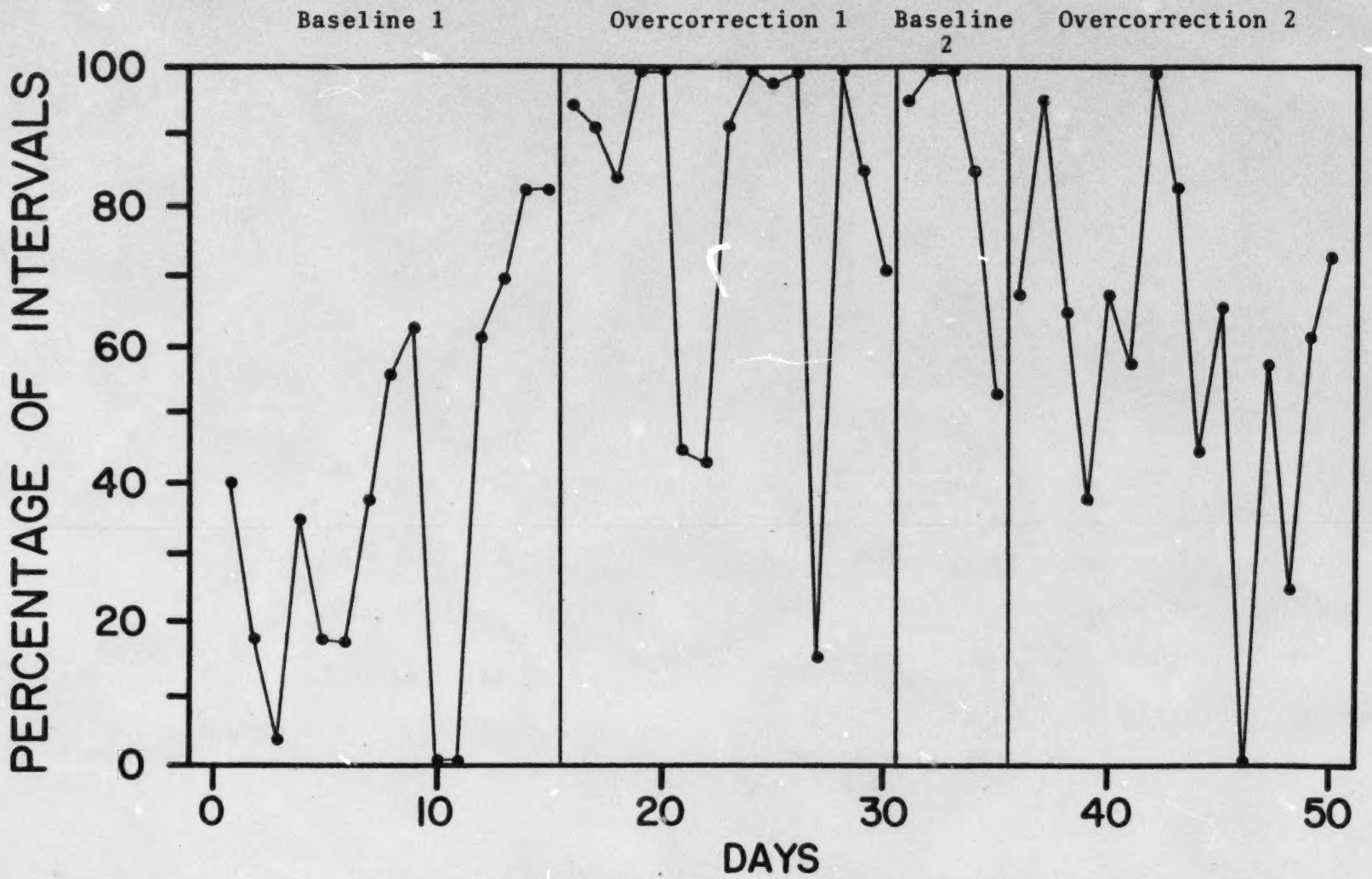

Figure 13. Percentage of the positive behavioral correlate, head-orientation, displayed across baseline and overcorrection conditions for subject 2

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However, this increase faded nearly 26 percentage points to an average of 60.5% during the final overcorrection condition. Table 4 indicates that none of the other statistical comparisons were significant. When the first and last conditions were compared, the final condition averaged over 21 percentage points higher that the mean for the initial baseline condition.

Hypothesis XIV examined the differences in the total positive behavioral correlates across the four experimental conditions. Figure 14 displays the time-series observations of this behavioral category across baseline and overcorrection conditions. During the baseline 1 condition, the mean level of this positive behavioral correlate was 60.1%. When overcorrection was implemented with the target behavior, the total positive behavioral correlates increased to a mean of 88.3%. Table 4 shows this increase of over 28 percentage points to be statistically non-significant ($p > .05$). No changes were noted during the baseline 2 condition. A decrease of over 17% was recorded, however, when the overcorrection procedures were re-established. A net gain of 11% was observed from the first to the last experimental condition. Table 4 reveals that neither of the last two statistical comparisons was significant ($p > .05$).

Hypothesis XV analyzed the changes that occurred in the negative behavioral correlate, unintelligible sounds, as a function of the overcorrection procedures applied to the target behavior. As indicated in Figure 15 unintelligible sounds averaged 20.3% during the first baseline condition.

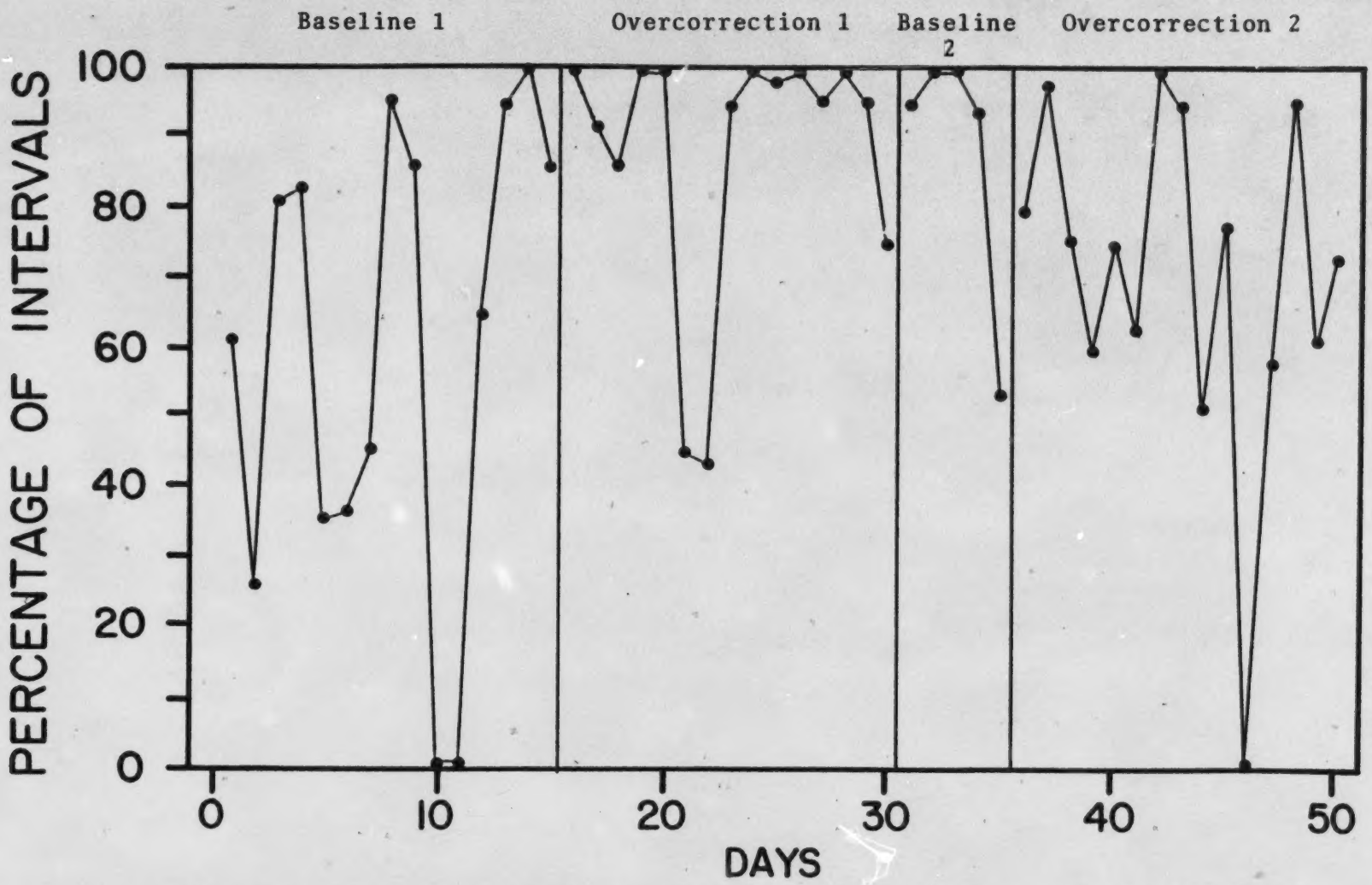

Figure 14. Percentage of the total positive behavioral correlates displayed across baseline and overcorrection conditions for subject 2

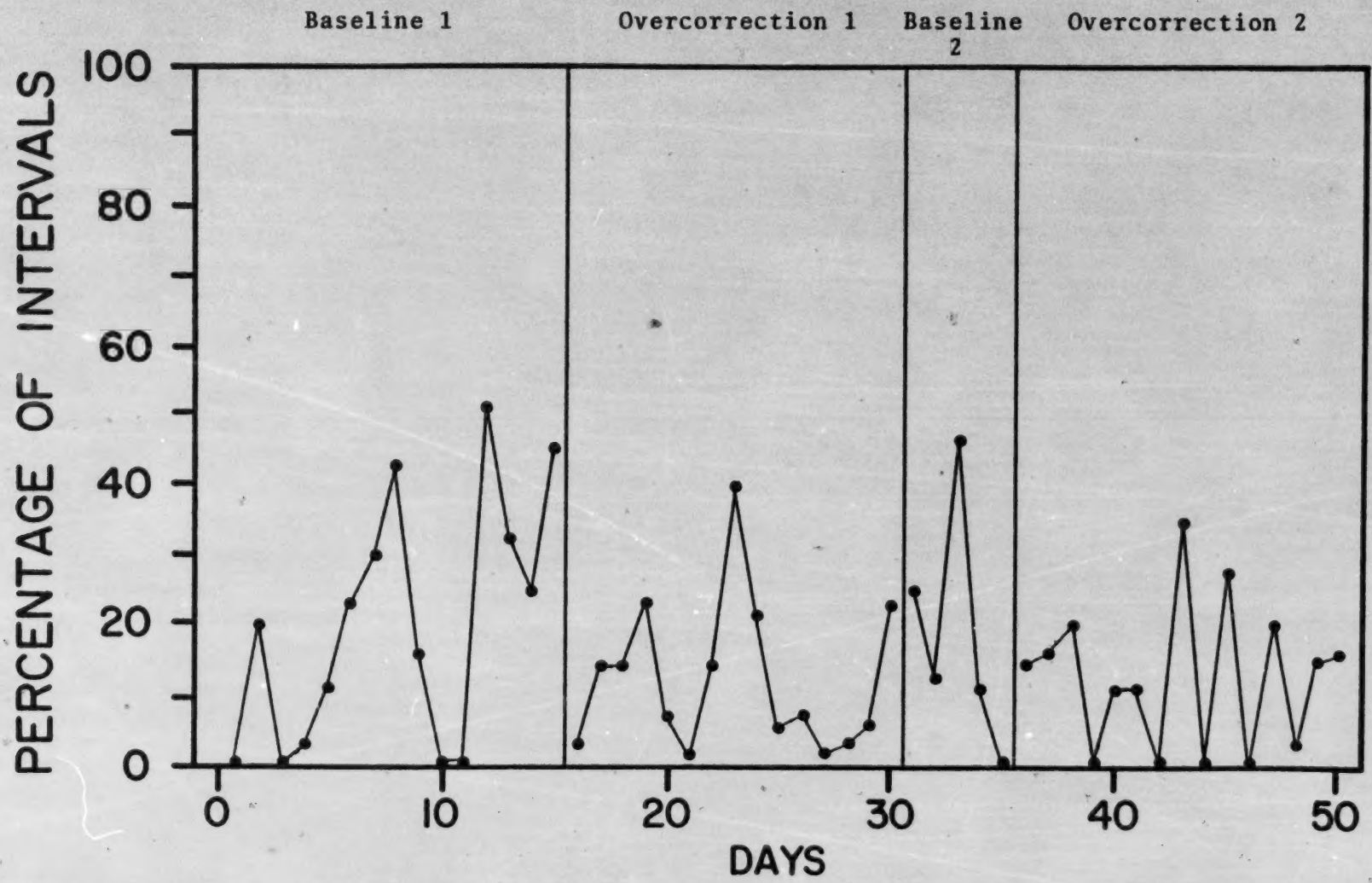

Figure 15. Percentage of the negative behavioral correlate, unintelligible sounds, displayed across baseline and overcorrection conditions for subject 2

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A decrease of nearly eight percentage points was recorded when the overcorrection 1 condition was implemented. As Table 4 shows, this difference was non-significant ($p > .05$). With the second baseline however, this negative behavioral correlate increased to the initial baseline level, averaging 19.4%. The re-application of overcorrection procedures was associated with a decrease to 12.9%, equalling the level of the first overcorrection condition. Table 4 shows that although these changes in mean levels of this negative behavioral correlate were systematic, they were not statistically different.

Hypothesis XVI examined the changes for the negative behavioral correlate, object-spinning, across the four experiment conditions. Figure 16 shows that this negative behavioral correlate did not occur throughout the experiment. Since no variance in the behavioral scores was recorded across the four experimental conditions, a time-series analysis of the data was not conducted. Table 4 shows an absence of *t* test scores for this negative behavioral correlate.

Hypothesis XVII investigated the effects of the overcorrection procedures applied to the target behavior on the negative behavioral correlate, body-rocking. As shown in Figure 17, body-rocking averaged 40% during the initial baseline condition. With the introduction of the overcorrection procedures applied to the target behavior, body-rocking decreased to an average of 12.9%, a difference of 28 percentage points. Table 4 shows that the increase during the

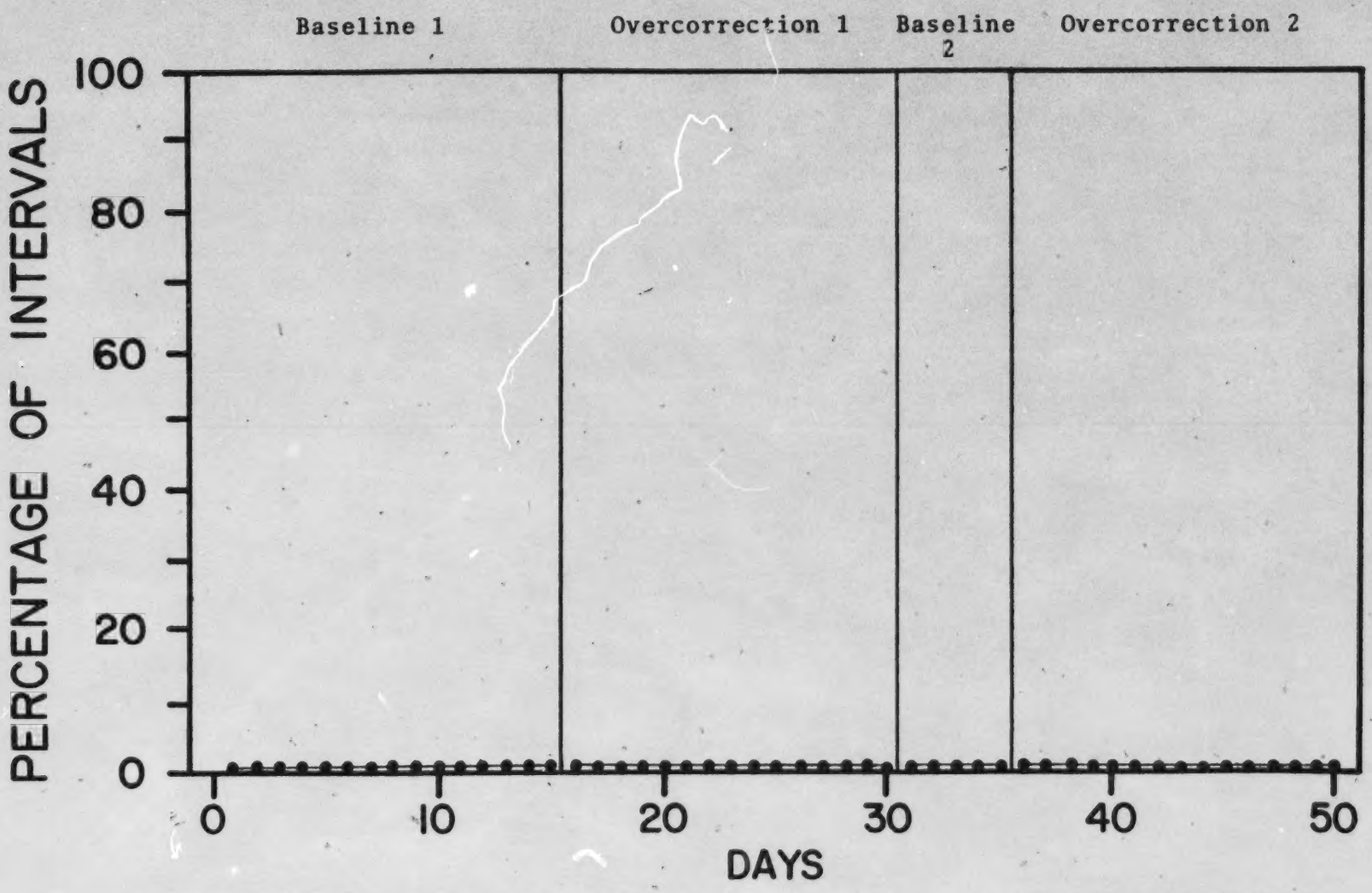

Figure 16. Percentage of the negative behavioral correlate, object-spinning, displayed across baseline and overcorrection conditions for subject 2

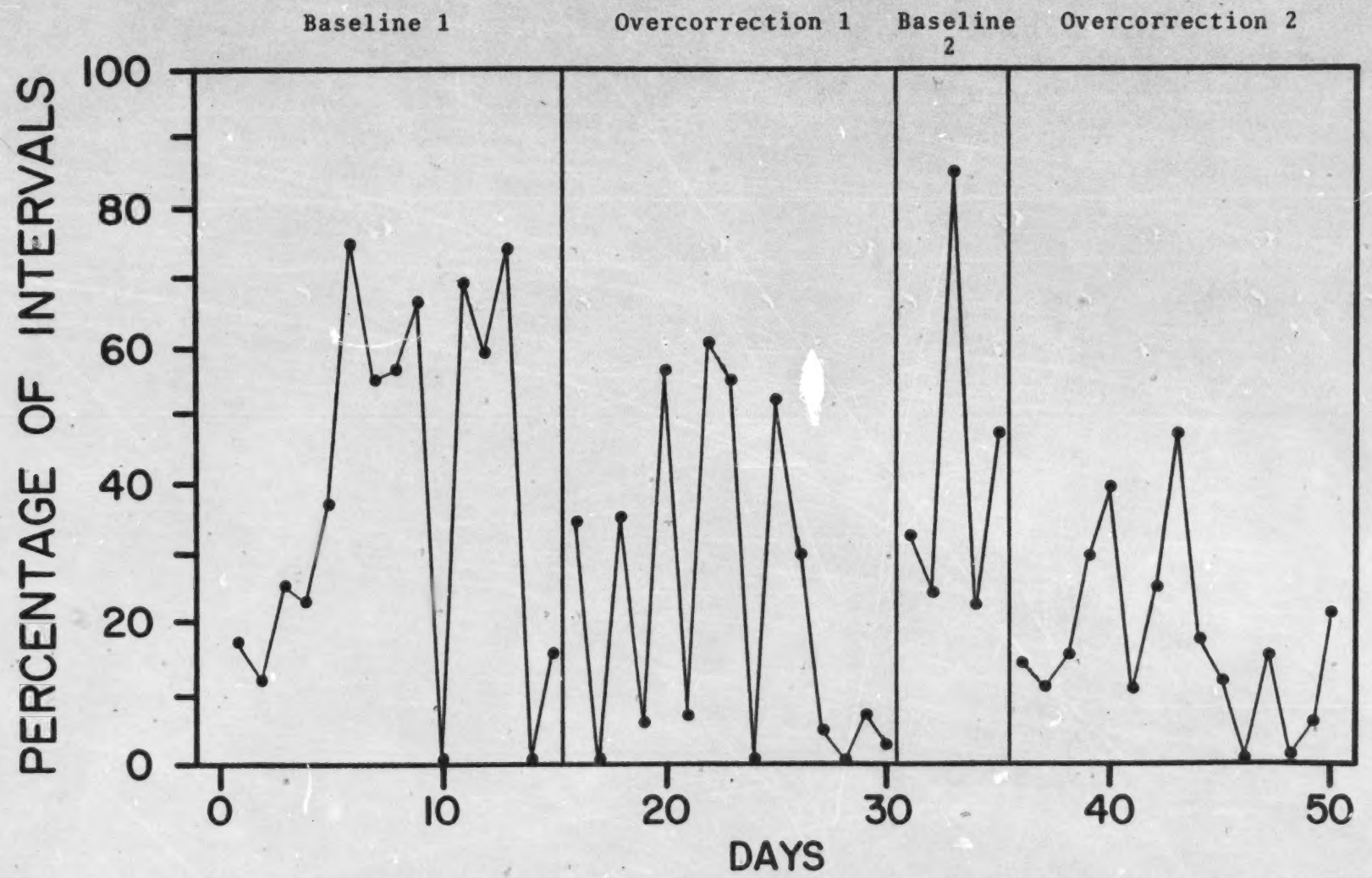

Figure 17. Percentage of the negative behavioral correlate, body-rocking, displayed across baseline and overcorrection conditions for subject 2

overcorrection 1 condition over the initial baseline was statistically significant ($p < .05$). With the removal of the overcorrection procedures, the mean level of body-rocking rose to 43.3%. This change, as shown in Table 4, was non-significant ($p > .05$). When the overcorrection procedures was re-applied to the target behavior, a decrease in body-rocking of over 24 percentage points occurred. According to Table 4, this difference was also found to be significant ($p < .05$).

Hypothesis XVIII examined the changes in the total negative behavioral correlates across the four experimental conditions. Figure 18 illustrates in graphic fashion the changes in this measurement category as it relates to the baseline and experimental interventions applied to the target behavior. During the first baseline condition, the mean level of the total negative behavioral correlates was 49.8%. This behavior decreased to an average of 28.3% when the over-correction procedures were applied to the target behavior (overcorrection 1). Table 4 shows this decrement to be significant at the established alpha level ($p < .05$). When the return to baseline conditions were implemented, the percentage of this behavioral measurement increased to an average of 50%. This change was not significant according to *t* test scores, shown on Table 4. Upon the re-establishment of overcorrection procedures, this behavioral category again decreased to an average of 29.1%. According to Table 4, this last comparison, between baseline 2 and overcorrection 2 conditions, resulted in significant differences ($p < .05$).

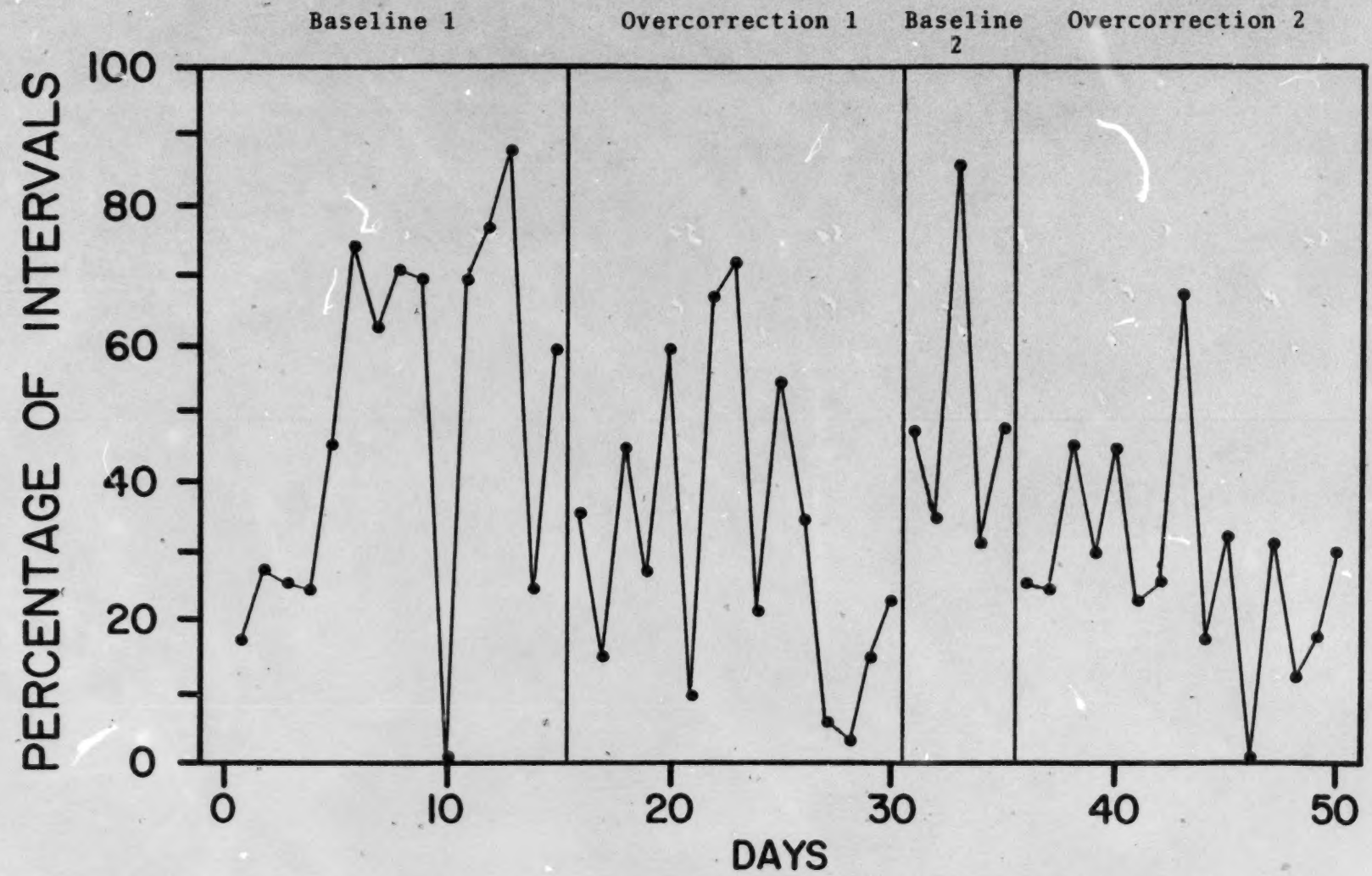

Figure 18. Percentage of the total negative behavioral correlates displayed across baseline and overcorrection conditions for subject 2

Subject 3

Hypothesis XIX examined the changes in the self-stimulatory target behavior, hand-flapping, as a result of the application of specific overcorrection procedures. Figure 19 shows that hand-flapping averaged 43.8% during the first baseline condition. With the implementation of the over-correction 2 condition, the level of hand-flapping behavior decreased to a mean of 7.9%, a difference of over 35 percentage points. The return to baseline phase (baseline 2) resulted in an increase in this target behavior to 40.3%, just slightly below the level recorded during the first baseline condition. Re-establishing the overcorrection procedures resulting in a decrease of over 35 percentage points to a mean level of 4.9%. Table 5 shows all comparisons to be significant at the .05 level of confidence.

Hypothesis XX sought to determine if significant differences in the positive behavioral correlate, proximity, were associated with the application of overcorrection procedures applied to the target behavior. Figure 20 displays the changes in this positive behavioral correlate across the four experimental conditions. During the first baseline condition, proximity was measured at an average of 19.9%. With the implementation of overcorrection procedures, the mean level of proximity increased to 42.2%, an increase of over 20 percentage points. This difference proved to be significant ($p < .05$), as shown in Table 5. Proximity decreased to an average of 26% during the second baseline

Table 5

Time-series analysis expressed in t test values for changes in nine behavior variables compared across baseline and overcorrection conditions for subject 3.

	Statistical Comparisons		
Behaviors	Baseline 1 vs Overcorrection 1	Overcorrection 1 vs Baseline 2	Baseline 2 vs Overcorrection 2
Hand-flapping	-7.42*	+3.89*	-4.17*
Proximity	+2.61*	-1.30	+1.02
Playing appropriately	+1.88	-2.16*	-.08
Head-orientation	+33.14*	-4.22*	+3.93*
Total positive behavioral correlates	+1.56	+1.43	-2.10*
Throwing	-3.66*	+.77	-.91
Unintelligible sounds	-4.21*	+1.89	-.82
Object-spinning	-3.67*	+1.28	-1.03
Total negative behavioral correlates	-4.63*	+1.42	-1.95

*$p < .05$

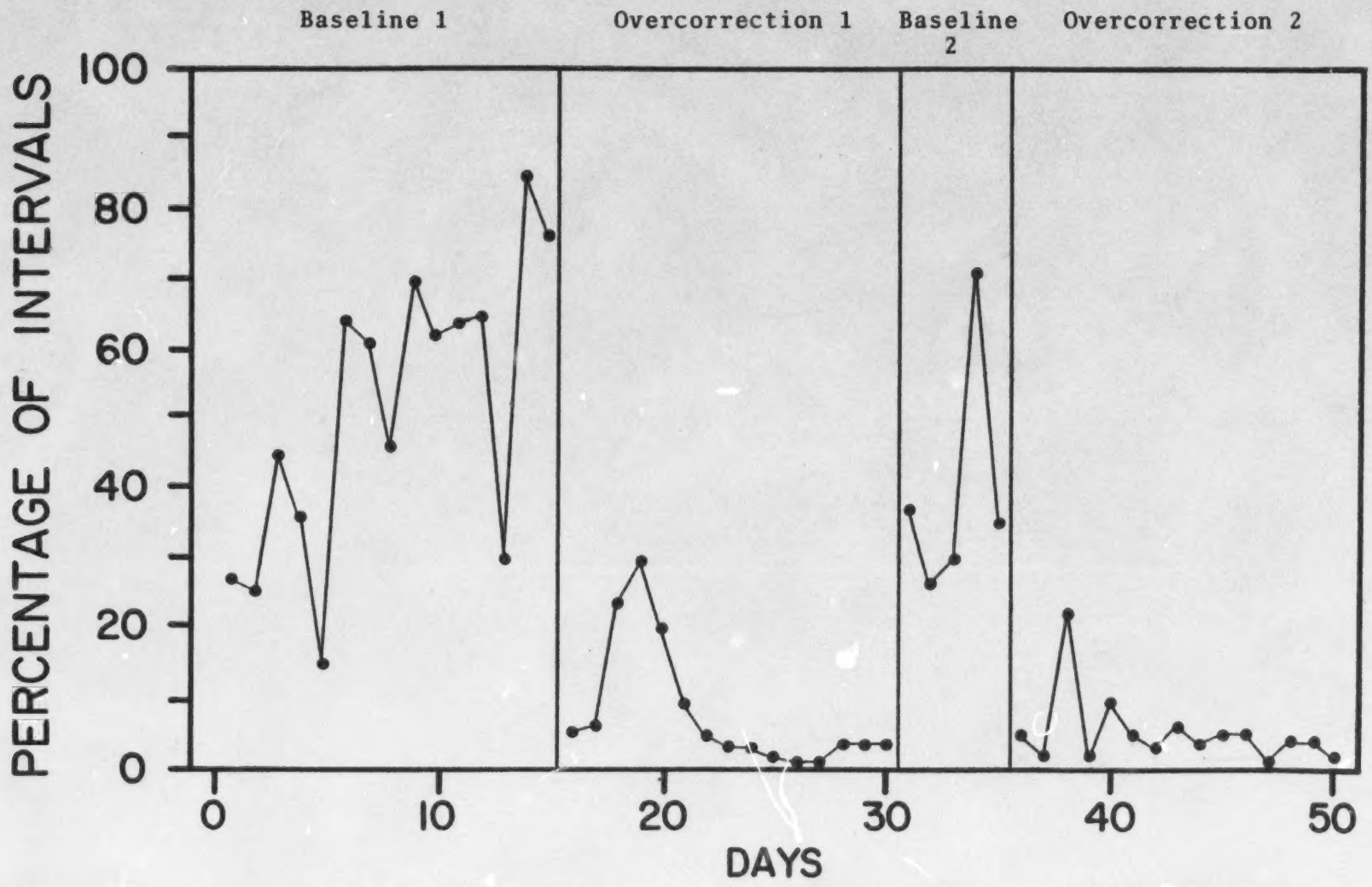

Figure 19. Percentage of the self-stimulatory target behavior, hand-flapping, displayed across baseline and overcorrection conditions for subject 3

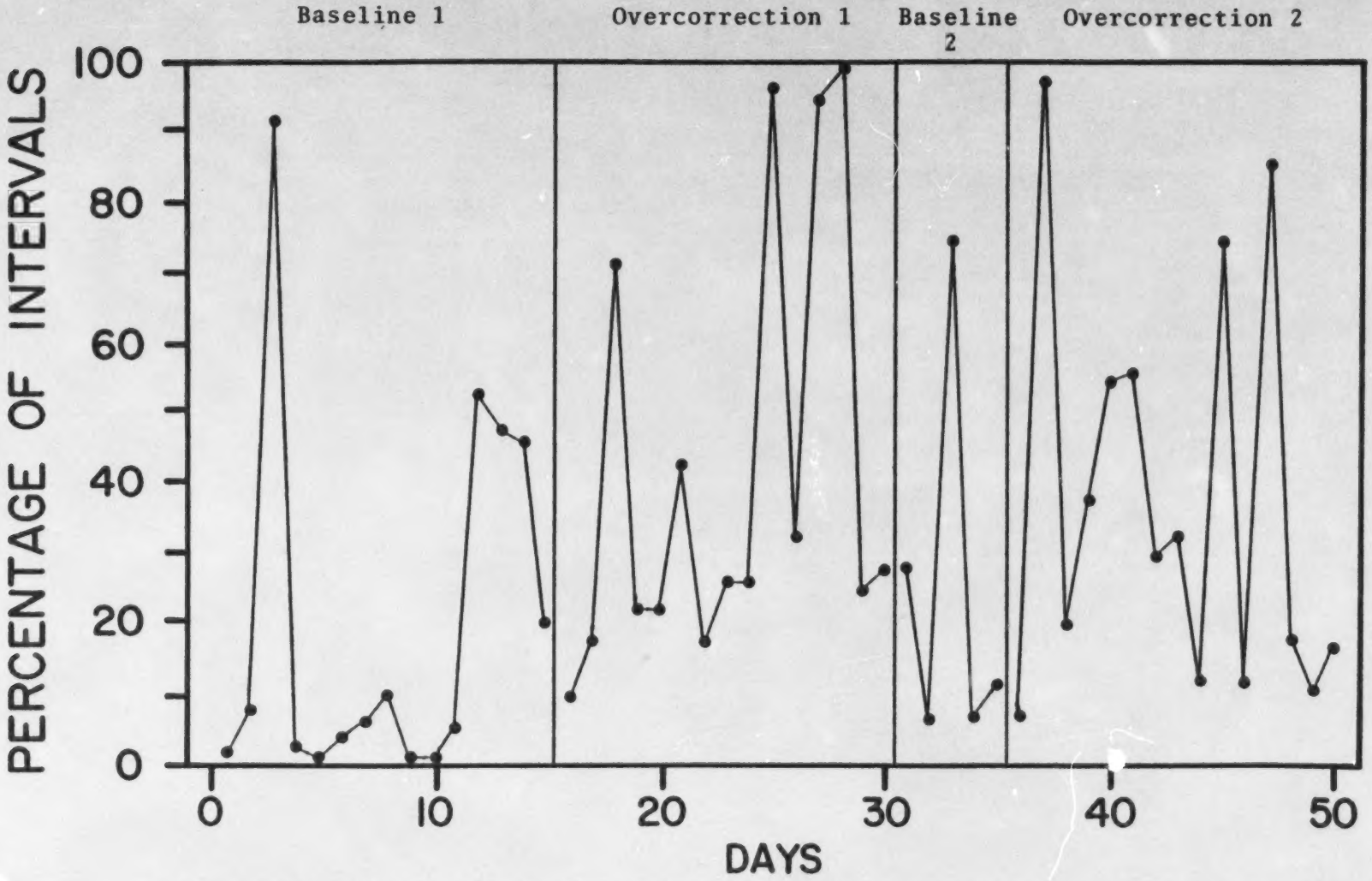

Figure 20. Percentage of the positive behavioral correlate, proximity, displayed across baseline and overcorrection conditions for subject 3

condition. The re-establishment of overcorrection procedures was associated with an increase in proximity behavior to a mean of 37.5%. Throughout the study, proximity increased by over 19 percentage points. Table 4 reveals that the comparisons between the overcorrection 1 and baseline 2, and baseline 2 and overcorrection 2 conditions were non-significant ($p > .05$).

Hypothesis XXI sought to determine the differences for the positive behavioral correlate, playing appropriately, across the four experimental conditions. Figure 21 displays the time-series observations for playing appropriately across the baseline and overcorrection conditions. This positive behavioral correlate averaged 7.8% during the first baseline condition. With the application of overcorrection procedures to the target behavior, playing appropriately rose to an average of 18%. Table 5 shows that the change between these two conditions was non-significant ($p > .05$). When a return to baseline conditions was instituted, playing appropriately decreased to a mean level of 1.3%. The onset of overcorrection procedures was associated with a further decrease in playing appropriately to .8%. Table 5 indicates significant differences between the overcorrection 1 condition and the baseline 2 condition, but not for the differences recorded for the final comparison.

Hypothesis XXII tested for differences in the positive behavioral correlate, head-orientation, across the four experimental conditions as a function of the overcorrection

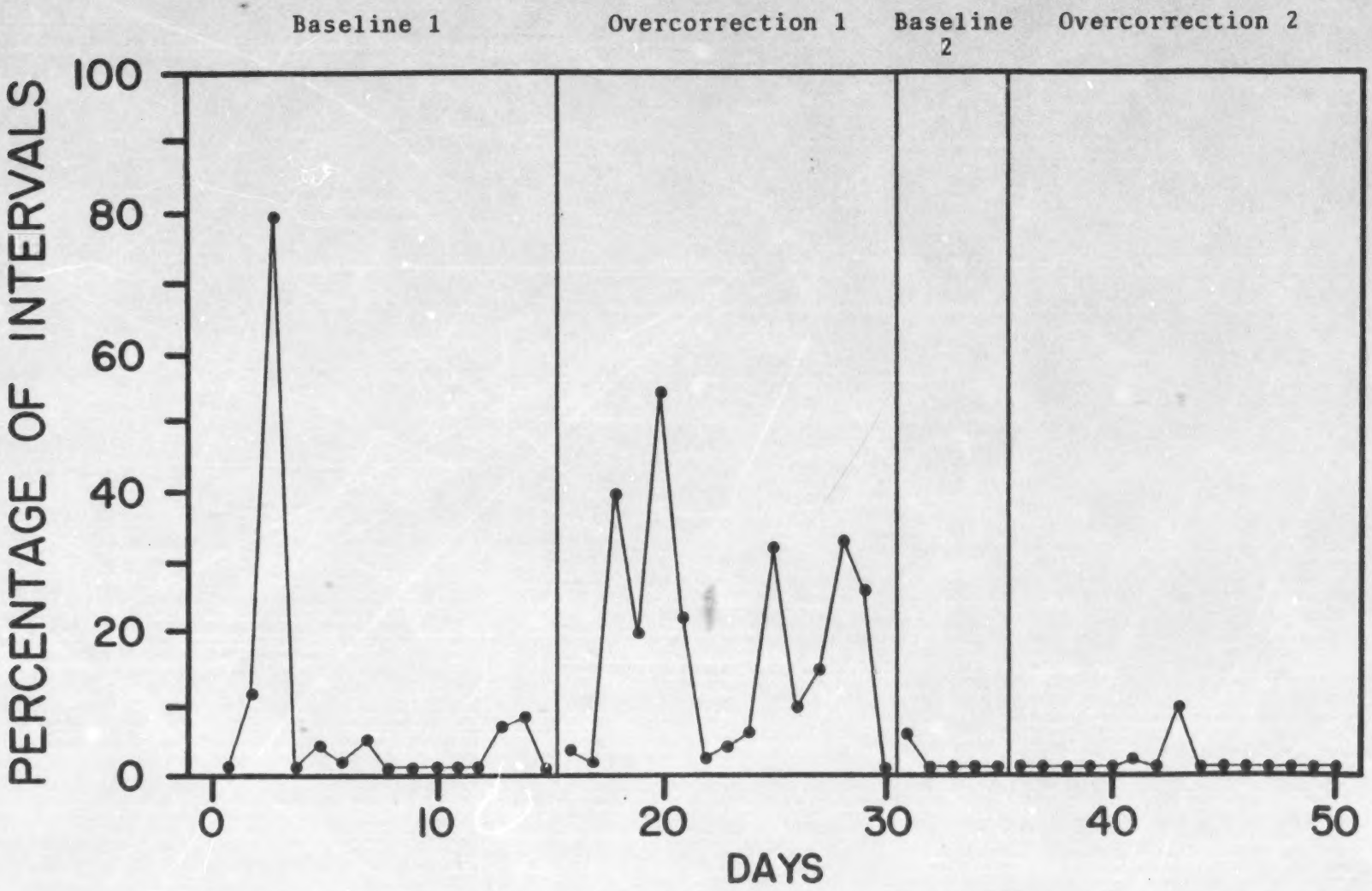

Figure 21. Percentage of the positive behavioral correlate, playing appropriately, displayed across baseline and overcorrection conditions for subject 3

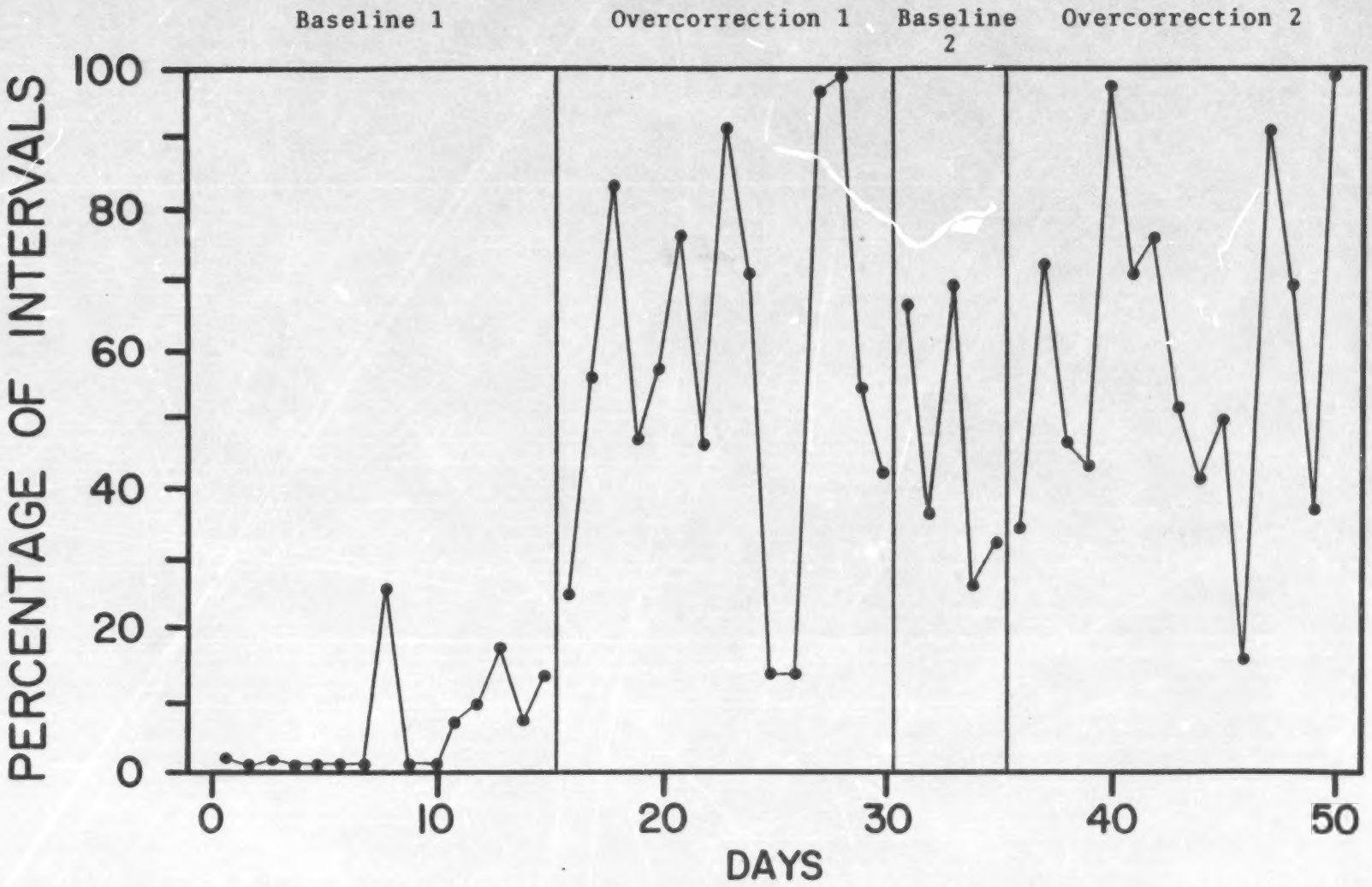

Figure 22. Percentage of the positive behavioral correlate, head-orientation, displayed across baseline and overcorrection conditions for subject 3

treatment procedures applied to the target behavior. Figure 22 shows that head-orientation averaged 5.8% during the initial baseline condition. An increase of over 50 percentage points to a mean level of 58.9% was associated with the overcorrection 1 condition. Table 5 indicates that this change was statistically significant ($p < .05$). Head-orientation decreased to an average of 47.3% during the second baseline condition. Table 5 shows that this decrease resulted in significant differences ($p < .05$) between the two conditions being compared. As revealed in Table 5, significant changes ($p < .05$) also were associated with the re-establishment of overcorrection procedures for the target behavior. Head-orientation increased to a mean level of 56.7% during this final treatment condition.

Hypothesis XXIII examined the differences in the total positive behavioral correlates across the four experimental conditions. Figure 23 shows the relationship of this behavioral measurement to the changing conditions associated with the target behavior. During the initial baseline condition, total positive behavioral correlates were measured at a mean level of 18.1%. With the implementation of the overcorrection 1 condition, this behavior increased to an average of 70.7%. Table 5 indicates that this change produced non-significant differences ($p > .05$), even though a gain of over 50 percentage points was noted. An average of 46.5% was associated with the baseline 2 condition, and again Table 5 revealed non-significant differences ($p > .05$). However, when overcorrection

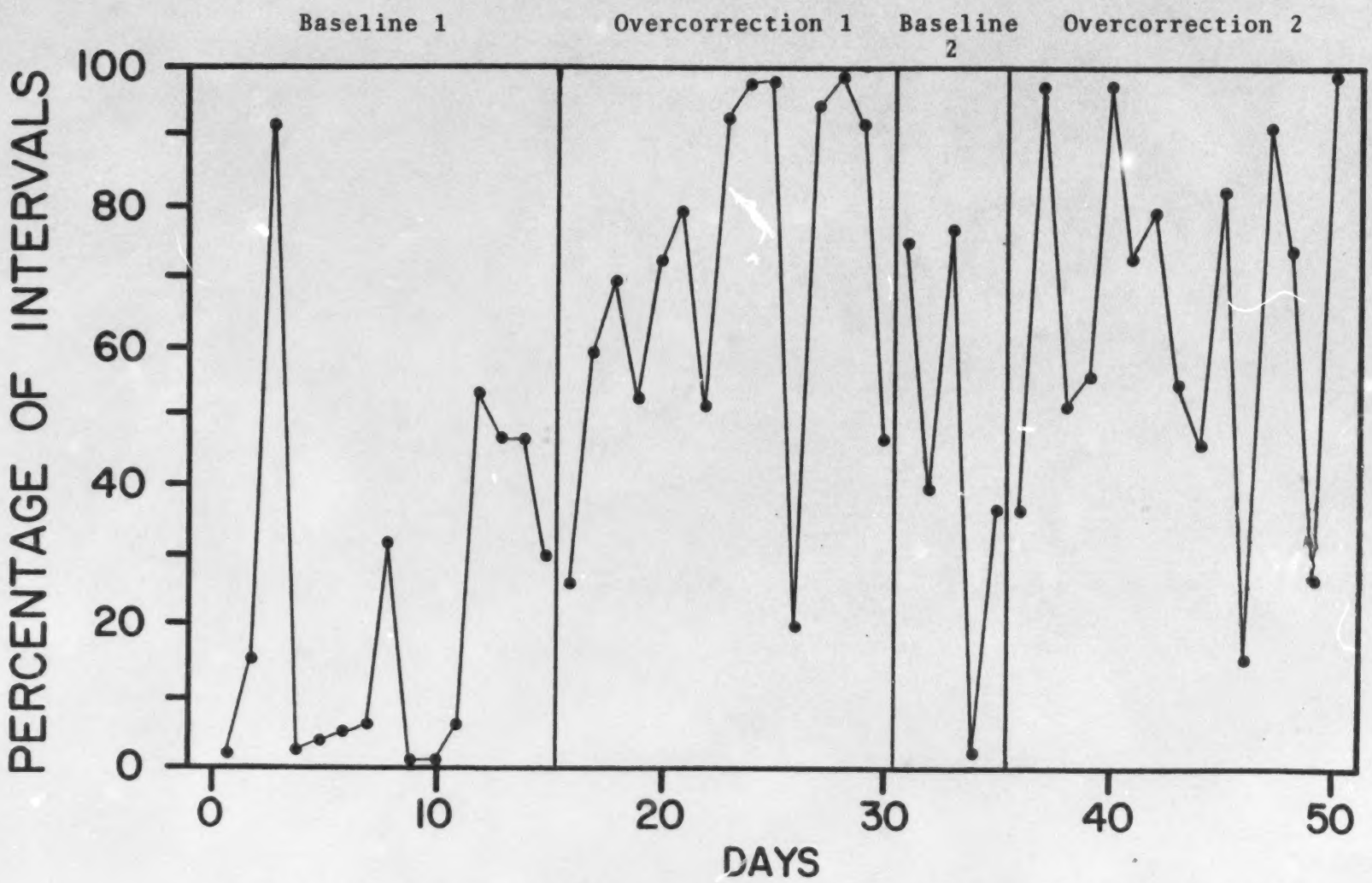

Figure 23. Percentage of the total positive behavioral correlates displayed across baseline and overcorrection conditions for subject 3

procedures were re-established, significant changes ($p < .05$), as shown in Table 5, resulted for this behavioral category. Total positive behavioral correlates averaged 69.8% during this final overcorrection treatment condition.

Hypothesis XXIV investigated the changes in the negative behavioral correlate, throwing, as a function of the overcorrection treatment across the four experimental conditions. Figure 24 shows that throwing behavior averaged 7.0% during the baseline 1 condition. Table 5 reveals that significant differences ($p < .05$) were detected when the overcorrection 1 condition was implemented. Throwing behavior decreased to an average of 1.9% during this condition. Although minor changes were observed for this behavior during the baseline 2 and overcorrection 2 conditions, non-significant differences were found as shown in Table 5. Throwing behavior did however, diminish by more than 5 percentage points from the first to the last conditions of the study.

Hypothesis XXV examined the differences in the negative behavioral correlate, unintelligible sounds, as a function of the overcorrection treatment applied to the target behavior. Figure 25 shows that unintelligible sounds averaged 28.1% during the first baseline condition. With the implementation of the overcorrection 1 condition, this negative behavioral correlate decreased to a mean of 15.7%, a difference of more than 12 percentage points. A time-series analysis of this difference, as revealed in Table 5, showed significant changes ($p < .05$). Unintelligible sounds increased

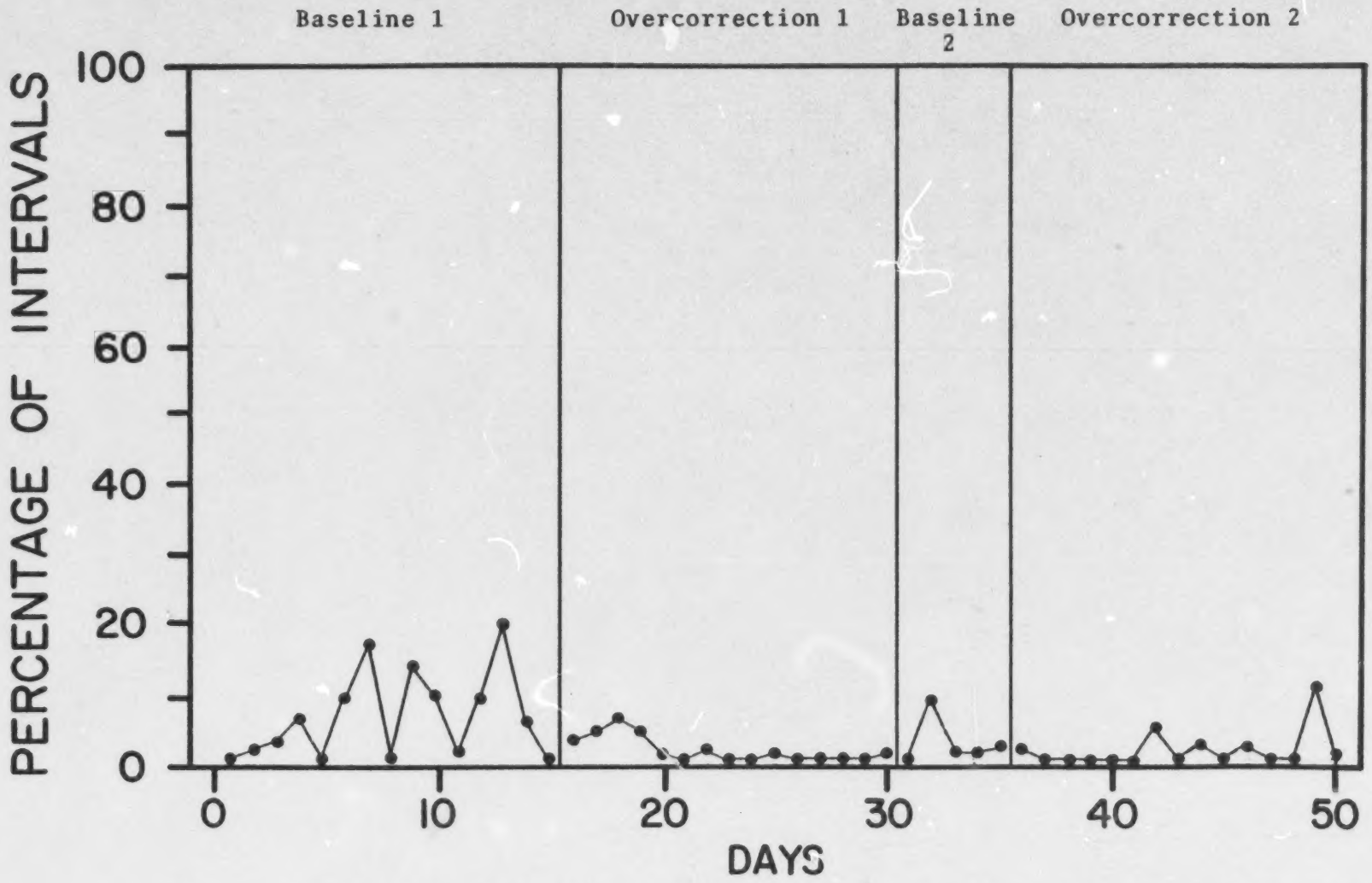

Figure 24. Percentage of the negative behavioral correlate, throwing, displayed across baseline and overcorrection conditions for subject 3

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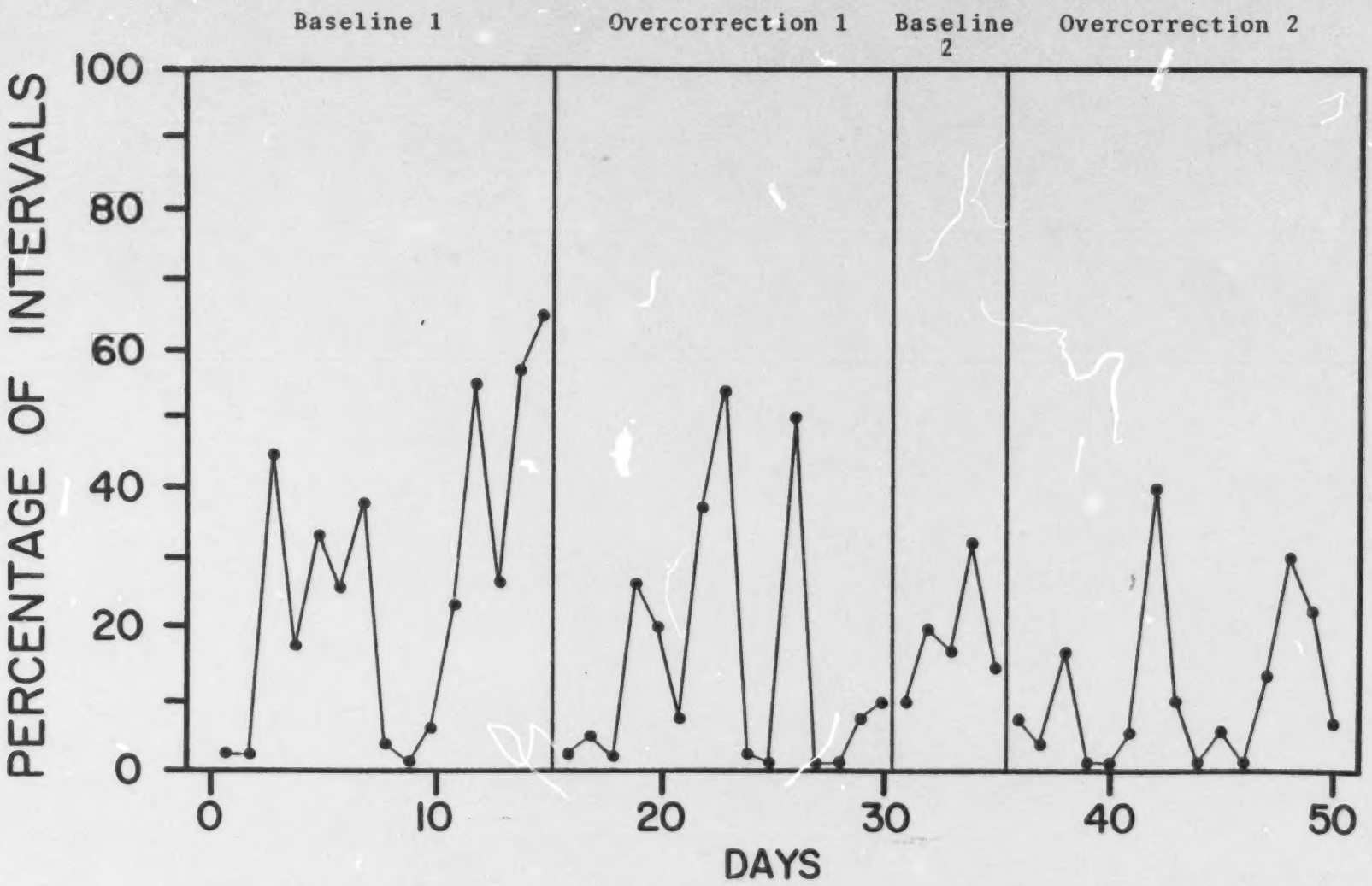

Figure 25. Percentage of the negative behavioral correlate, unintelligible sounds, displayed across baseline and overcorrection conditions for subject 3

slightly when the baseline 2 condition was implemented. Table 5 revealed that the differences were non-significant ($p > .05$). Figure 25 shows this negative behavioral correlate decreased to a mean of 10.9%. Table 5 shows this difference to be non-significant ($p > .05$). In terms of an over-all change, a net decrease of over 18% was noted for this negative behavioral correlate over the course of the study.

Hypothesis XXVI investigated the differences in the negative behavioral correlate, spinning objects, across the four experimental conditions. Figure 26 shows that spinning objects averaged 18.7% during the first baseline condition. Table 5 shows that a significant decrease ($p < .05$), to a mean level of 1.3%, was recorded when the overcorrection 1 condition was implemented. Returning to baseline conditions was associated with an increase in spinning objects to a mean of 10.2%. Even though an increase was noted, Table 5 shows non-significant differences ($p > .05$) were found. Similarly, Table 5 shows non-significant changes ($p > .05$) were associated with the decrease in spinning objects during the final treatment conditions.

Hypothesis XXVII investigated the differences for the total negative behavioral correlates across the four experimental conditions. Figure 27 shows the time-series observations for this behavioral category in relation to changes associated with the target behavior. This behavioral measurement averaged 47% during the initial baseline condition. When overcorrection conditions were established for the target

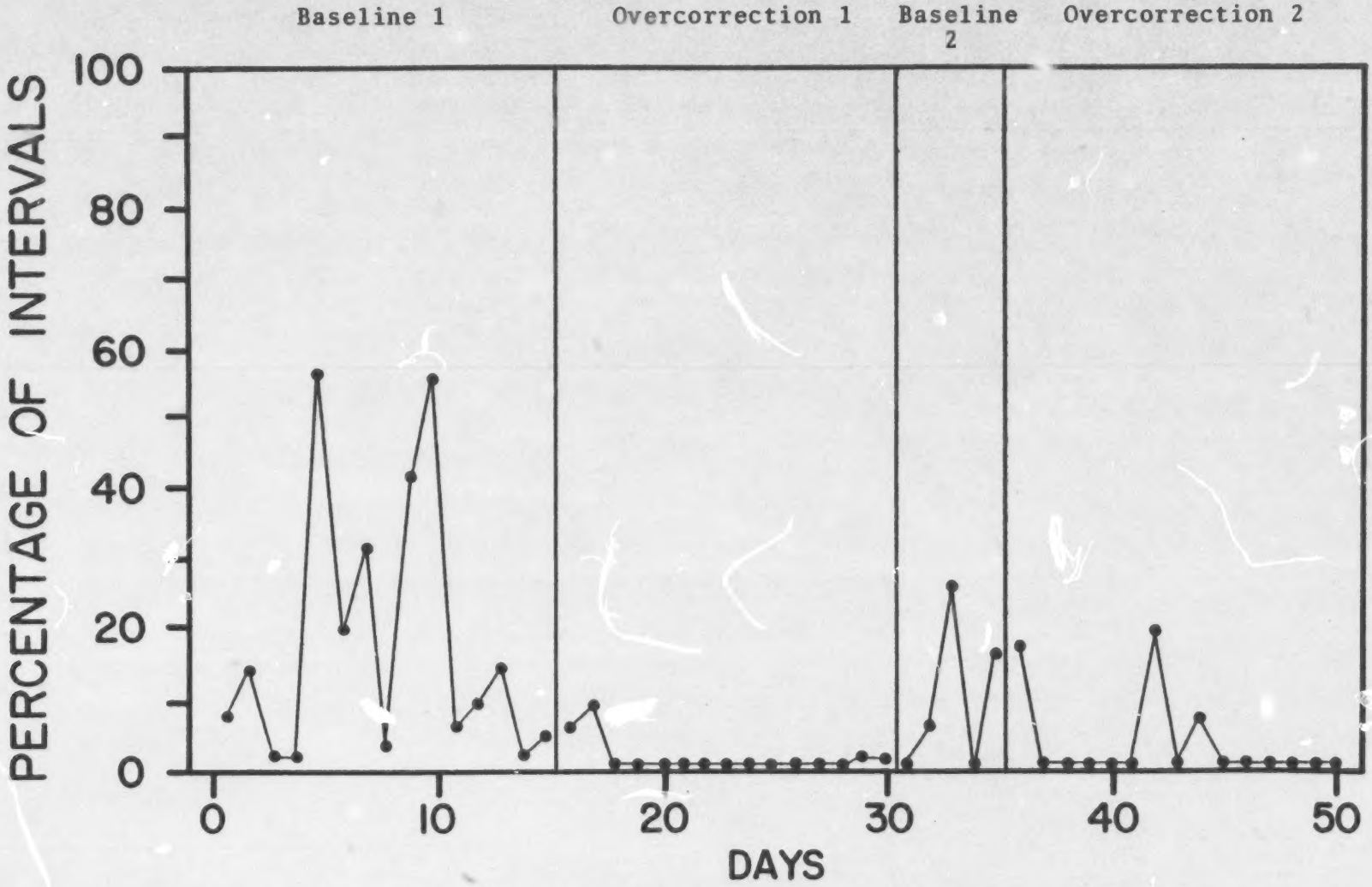

Figure 26. Percentage of the negative behavioral correlate, object-spinning, displayed across baseline and overcorrection conditions for subject 3

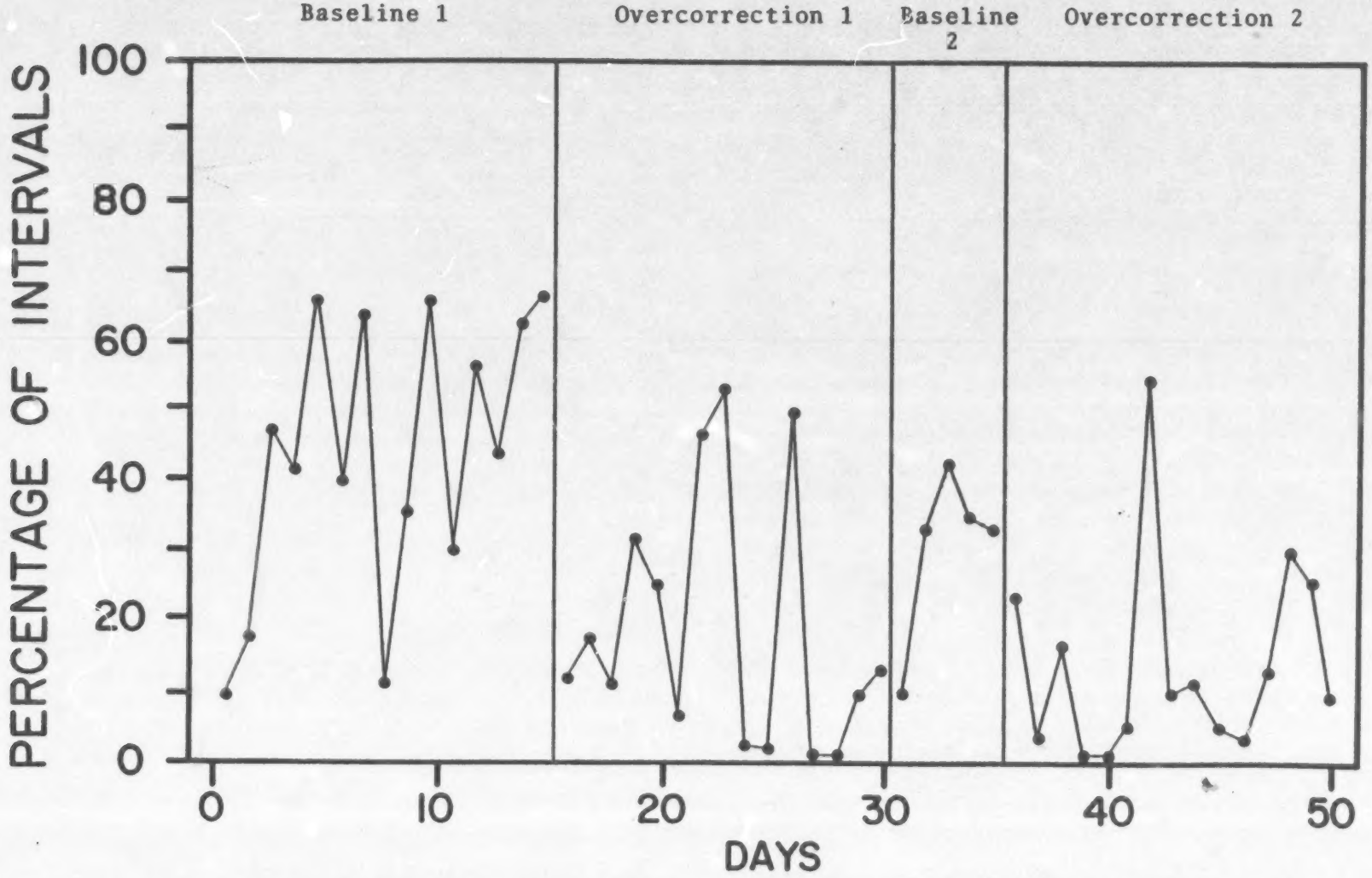

Figure 27. Percentage of the total negative behavioral correlates displayed across baseline and overcorrection conditions for subject 3

behavior, this behavior decreased to an average level of 18.7%. Table 5 shows this difference to be significant ($p < .05$). A mean of 28.8% was associated with the baseline 2 condition. However, this 10 percentage point difference was non-significant ($p > .05$), as revealed in Table 5. When the overcorrection 2 condition was instituted, total negative behavioral correlates decreased to a mean of 14.1%. The time-series analysis, comparing the differences between the data from the baseline 2 and overcorrection 2 conditions, resulted in a declaration of non-significant changes ($p > .05$) as shown in Table 5.

Subject 4

Hypothesis XXVIII examined the differences in the self-stimulatory target behavior, repetitive verbalizations, across the baseline and overcorrection treatment conditions. Figure 28 displays the time-series observations for this target behavior. Repetitive verbalizations averaged 65.9% during the first baseline condition. When overcorrection treatment was applied to this behavior, a decrease of over 34 percentage points to an average of 31.% was recorded. This difference, as revealed in Table 6, proved to be statistically significant ($p < .05$). Removing the overcorrection treatment procedures (baseline 2) was associated with an increase to a mean of 61.2%. Table 6 shows this change also was statistically significant ($p < .05$). With the institution of the overcorrection procedures in the final condition, the

Table 6

Time-series analysis expressed in t test values for changes in nine behavior variables compared across baseline and overcorrection conditions for subject 4.

Behaviors	Statistical Comparisons		
	Baseline 1 vs Overcorrection 1	Overcorrection 1 vs Baseline 2	Baseline 2 vs Overcorrection 2
Repetitive verbalizations	-5.83*	+3.55*	-5.62*
Proximity	+3.31*	-1.99	+.19
Playing appropriately	+2.96*	-1.73	-.01
Head-orientation	+4.13*	-1.64	+.29
Total positive behavioral correlates	+4.20*	-2.11*	+.83
Jumping	-14.25*	+5.88*	-7.15*
Body-spinning	-2.58*	-.60	-.04
Object-spinning	----	----	----
Total negative behavioral correlates	-3.33*	+.19	-.68

*$p < .05$

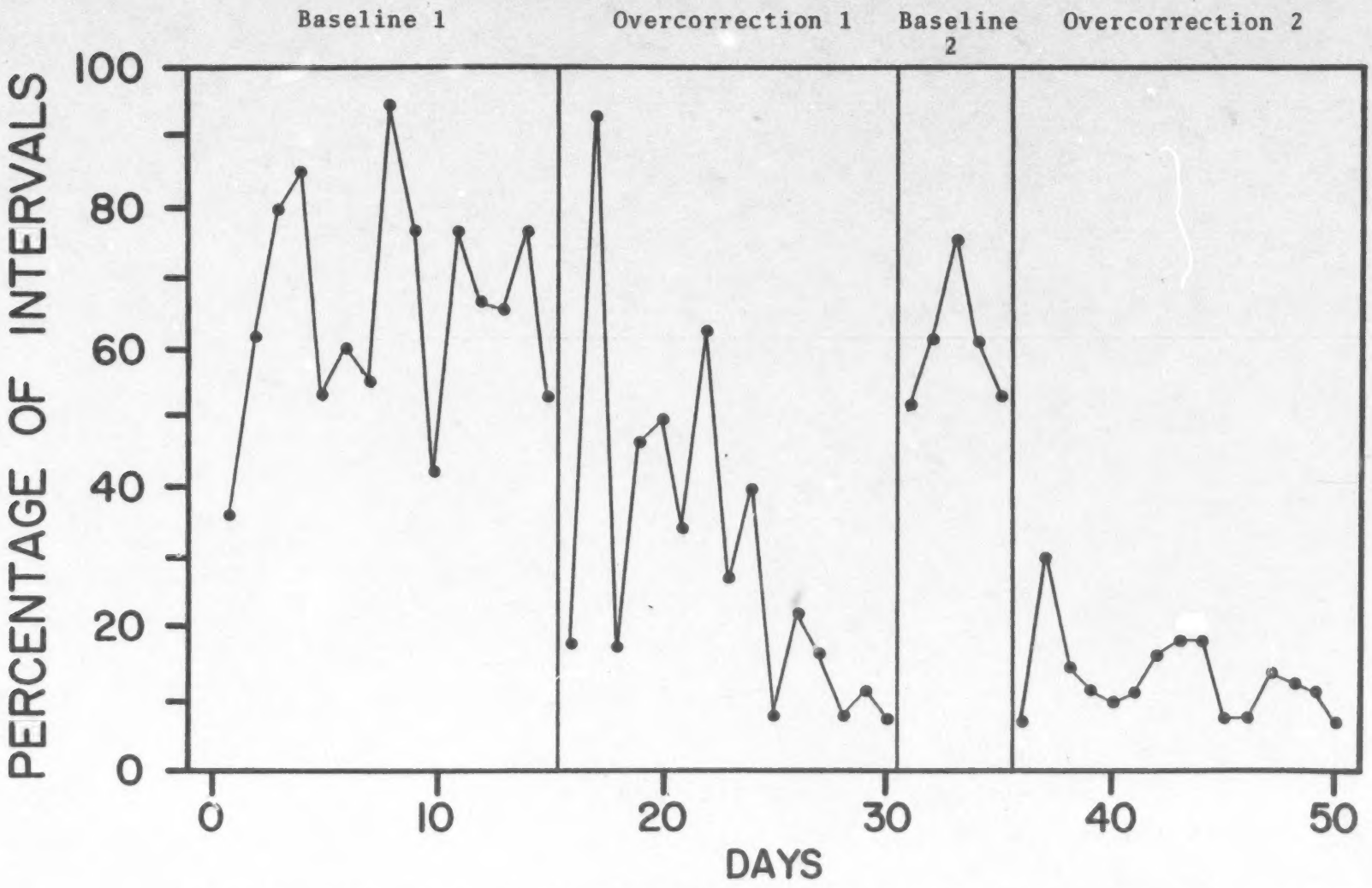

Figure 28. Percentage of the self-stimulatory target behavior, repetitive verbalizations, displayed across baseline and overcorrection conditions for subject 4

percentage of repetitive verbalizations decreased to an average of 11.5%. An inspection of Table 6 reveals that this decrease was statistically significant ($p < .05$).

Hypothesis XXIX investigated the differences in the positive behavioral correlate, proximity, as a function of the overcorrection procedures applied to the target behavior. Figure 29 shows that during the first baseline condition, proximity averaged 17%. An average of 49.1% was recorded when the overcorrection 1 condition was instituted. Table 6 indicates this difference of over 32 percentage points was found to be significant ($p < .05$). A mean of 21.7% resulted when the return to baseline conditions was established. This change was shown in Table 6 to be non-significant. Upon the re-establishment of the final overcorrection condition, a mean level of 24.9% for proximity was recorded. However, as Table 6 shows, this change was non-significant.

Hypothesis XXX sought to determine the differences in the positive behavioral correlate, playing appropriately, across the four experimental conditions. Figure 30 shows that playing appropriately averaged 2.1% during the first baseline condition. An increase of over 16 percentage points to a mean level of 18.9% was associated with the overcorrection 1 condition. Table 6 shows that this increase proved to be statistically significant ($p < .05$). With a return to baseline conditions, playing appropriately was measured at a mean of 5%, a decrease of 13.9%. The time-series analysis of this change indicated non-significant differences ($p > .05$),

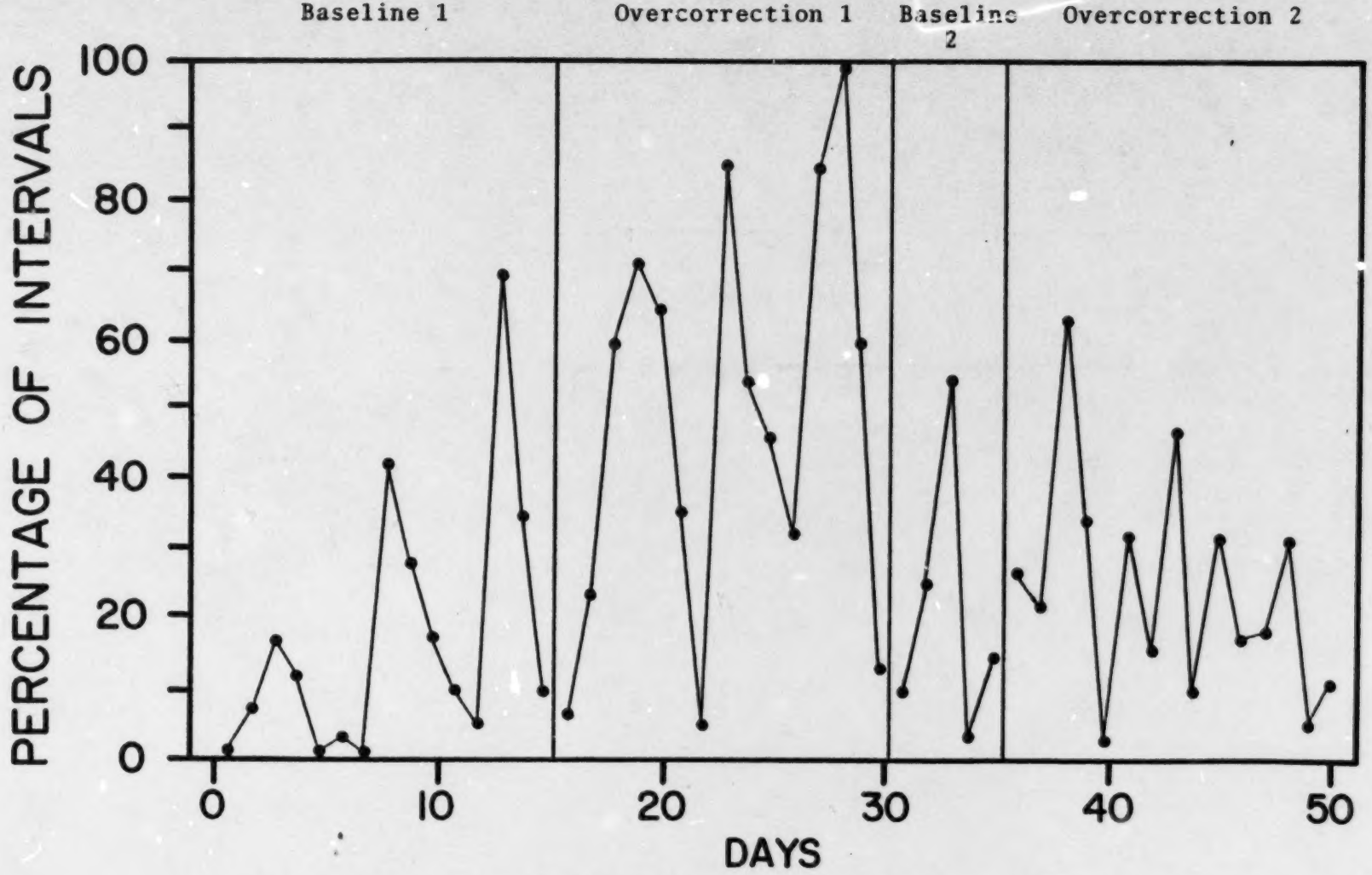

Figure 29. Percentage of the positive behavioral correlate, proximity, displayed across baseline and overcorrection conditions for subject 4

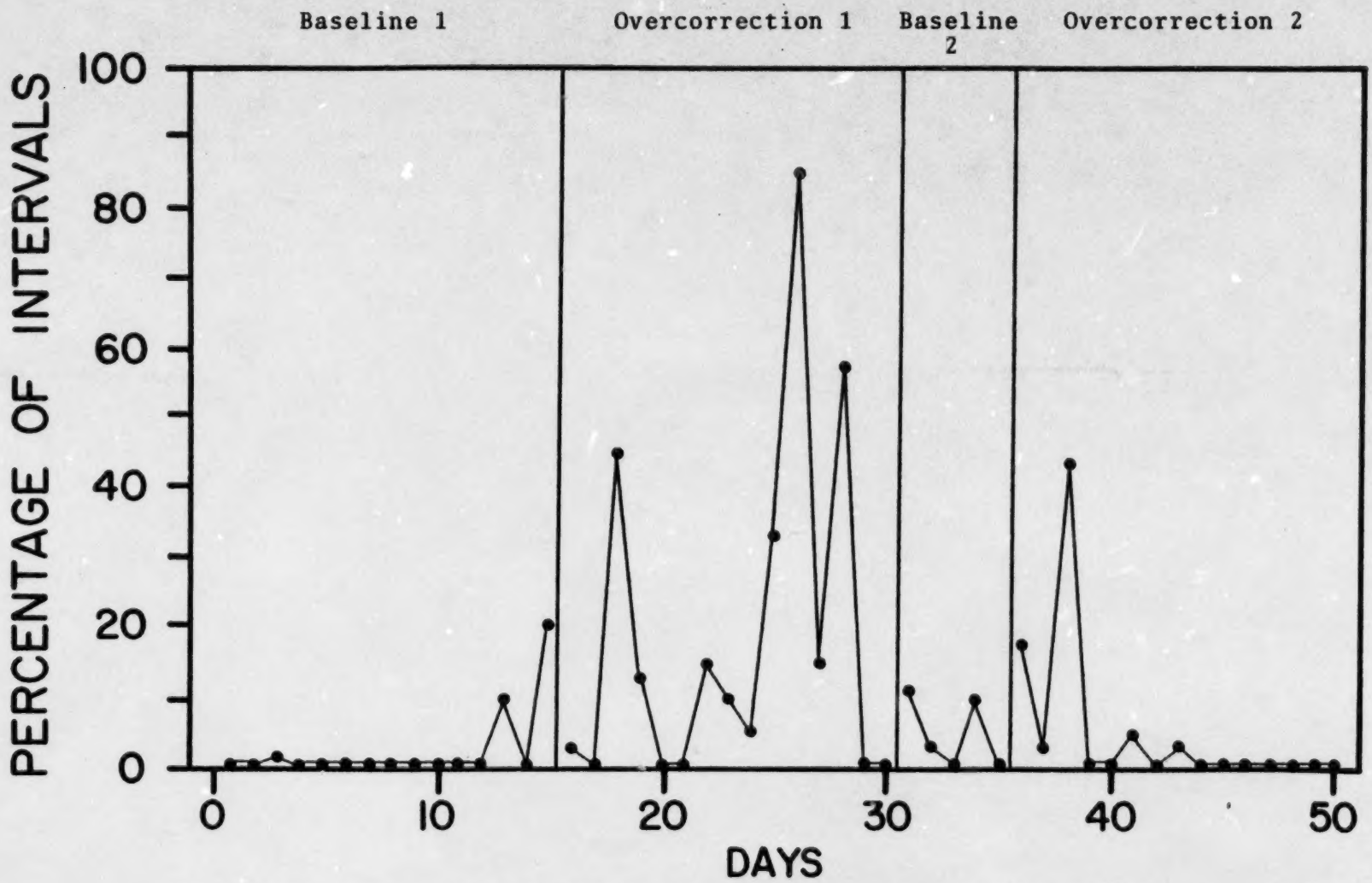

Figure 30. Percentage of the positive behavioral correlate, playing appropriately, displayed across baseline and overcorrection conditions for subject 4

as shown in Table 6. This positive behavioral correlate increased to a mean of 9.8% during the overocrrection 2 condition. Table 6 shows this difference was non-significant ($p > .05$).

Hypothesis XXXI sought to determine if differences in the positive behavioral correlate, head-orientation, existed across conditions. Figure 31 shows the time-series observation on this positive behavioral correlate. During the first baseline condition, head-orientation averaged 9%. When the overcorrection 1 condition was implemented, the mean level of this behavior increased to 49%. As Table 6 shows, this change of 40 percentage points, proved to be statistically significant ($p < .05$). Head-orientation decreased by 22.3 percentage points when the second baseline condition was implemented. This change was non-significant ($p > .05$) as shown in Table 6. Upon the re-establishment of overcorrection procedures, head-orientation increased slightly to a mean of 30%. Table 6 shows this difference to be non-significant ($p > .05$).

Hypothesis XXXII examined the differences in the total positive behavioral correlates across the four experimental conditions. Figure 32 shows that during the initial baseline condition, this behavioral measure averaged 19.3%. The application of overcorrection procedures was accompanied by an increase in this behavior to a mean level of 64.2%. Table 6 shows that this change was determined to be statistically significant ($p < .05$). The average of this behavior

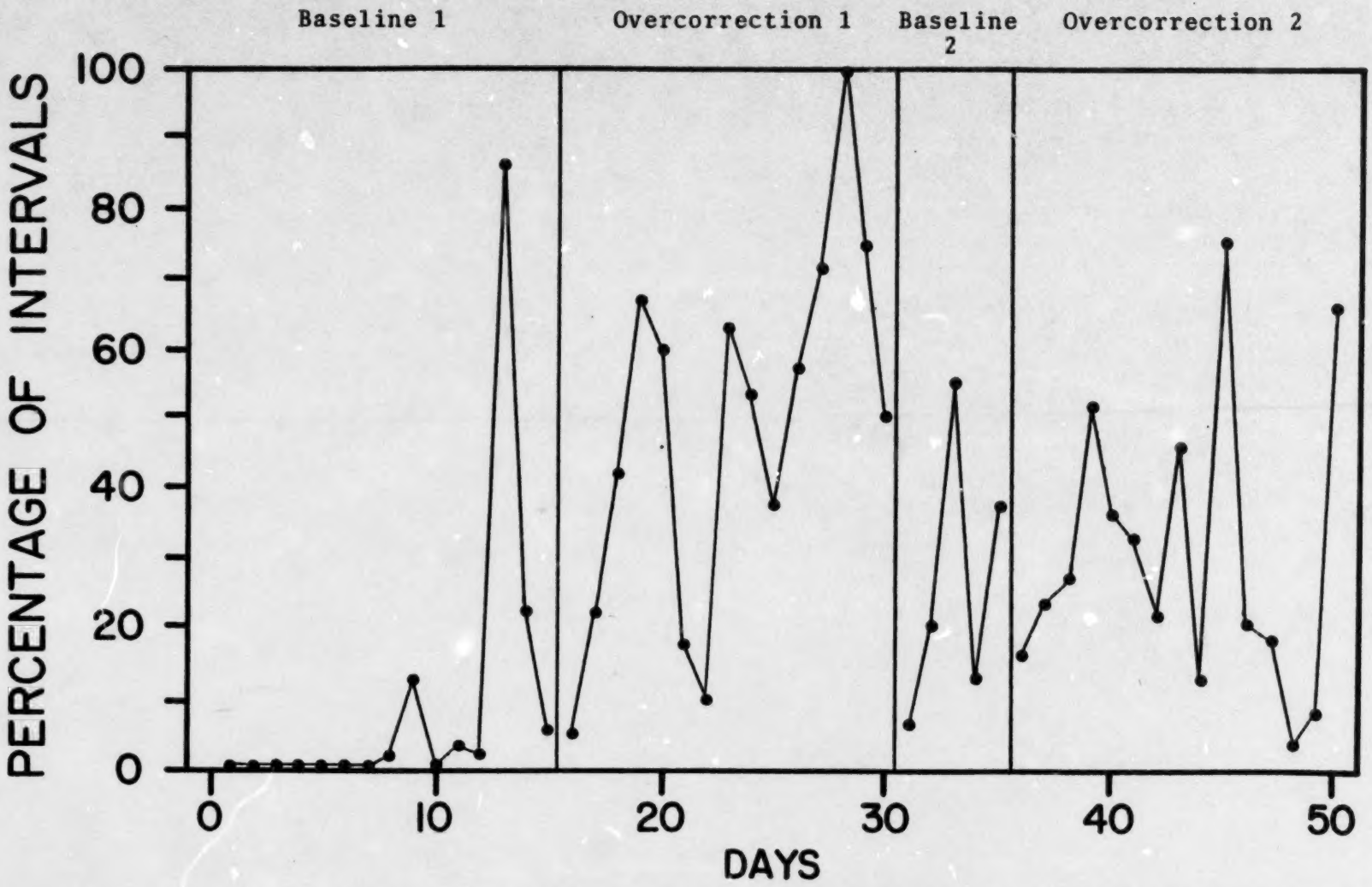

Figure 31. Percentage of the positive behavioral correlate, head-orientation, displayed across baseline and overcorrection conditions for subject 4

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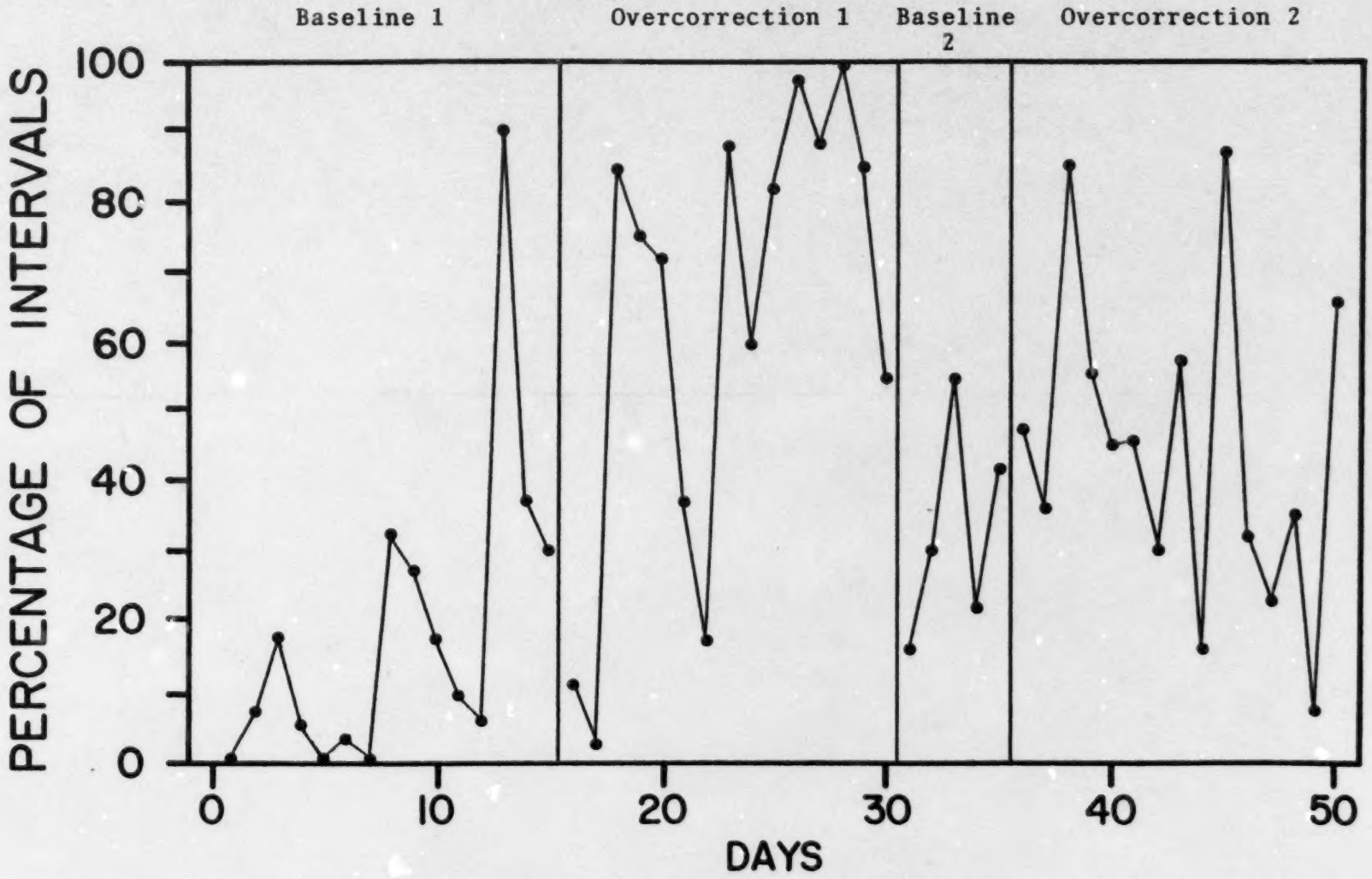

Figure 32. Percentage of the total positive behavioral correlates displayed across baseline and overcorrection conditions for subject 4

decreased to 33% when the second baseline condition was implemented. As Table 6 reveals, this change was significant ($p < .05$) when the overcorrection 2 condition was established, the average percentage of this behavior was 45%. This change was non-significant ($p > .05$) as shown in Table 6.

Hypothesis XXXIII dealt with the differences in the positive behavioral correlate, jumping, across the four experimental conditions. Figure 33 displays the time-series observations for this behavior. During the initial baseline condition, jumping occurred at an average of 5.7%. A drop to a mean of 2% was associated with the intitution of the overcorrection 1 condition. Table 6 shows that this change was found to be significant ($p < .05$). The percentage of jumping increased again with the removal of the overcorrection procedures to a mean of 5.%. When overcorrection conditions were re-established, jumping behavior dropped to 1.1%. Both of these last two changes across experimental conditions were tested and found to be significant ($p < .05$), as Table 6 reveals.

Hypothesis XXXIV examined the differences in the negative behavioral correlate, body-spinning. Figure 34 shows that during the first baseline condition, this behavior averaged 10.2%.

The application of overcorrection procedures was accompanied by a decrease in body-spinning to a mean of 3.2%. Table 6 shows this change to be significant ($p < .05$).

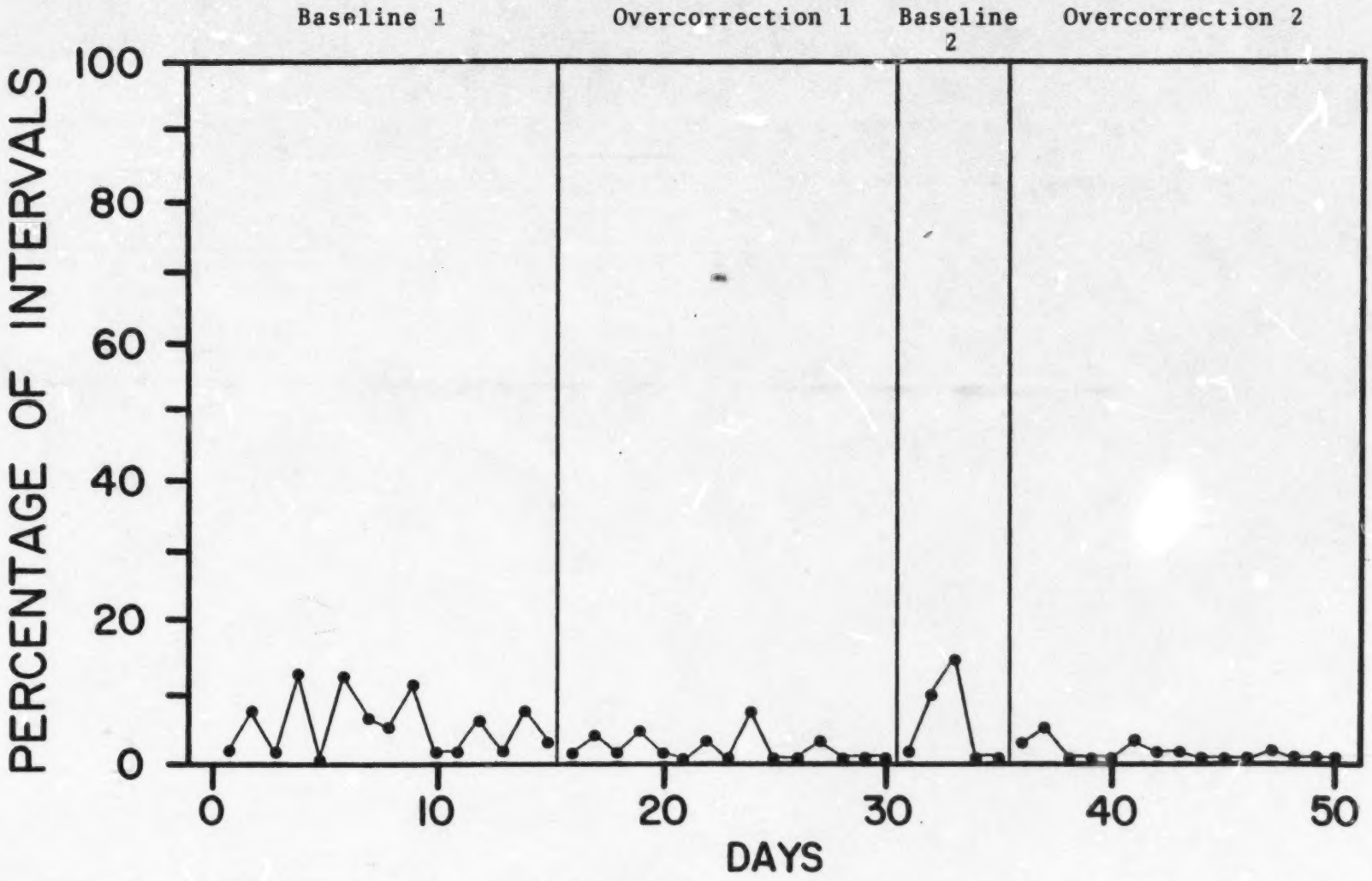

Figure 33. Percentage of the negative behavioral correlate, jumping, displayed across baseline and overcorrection conditions for subject 4

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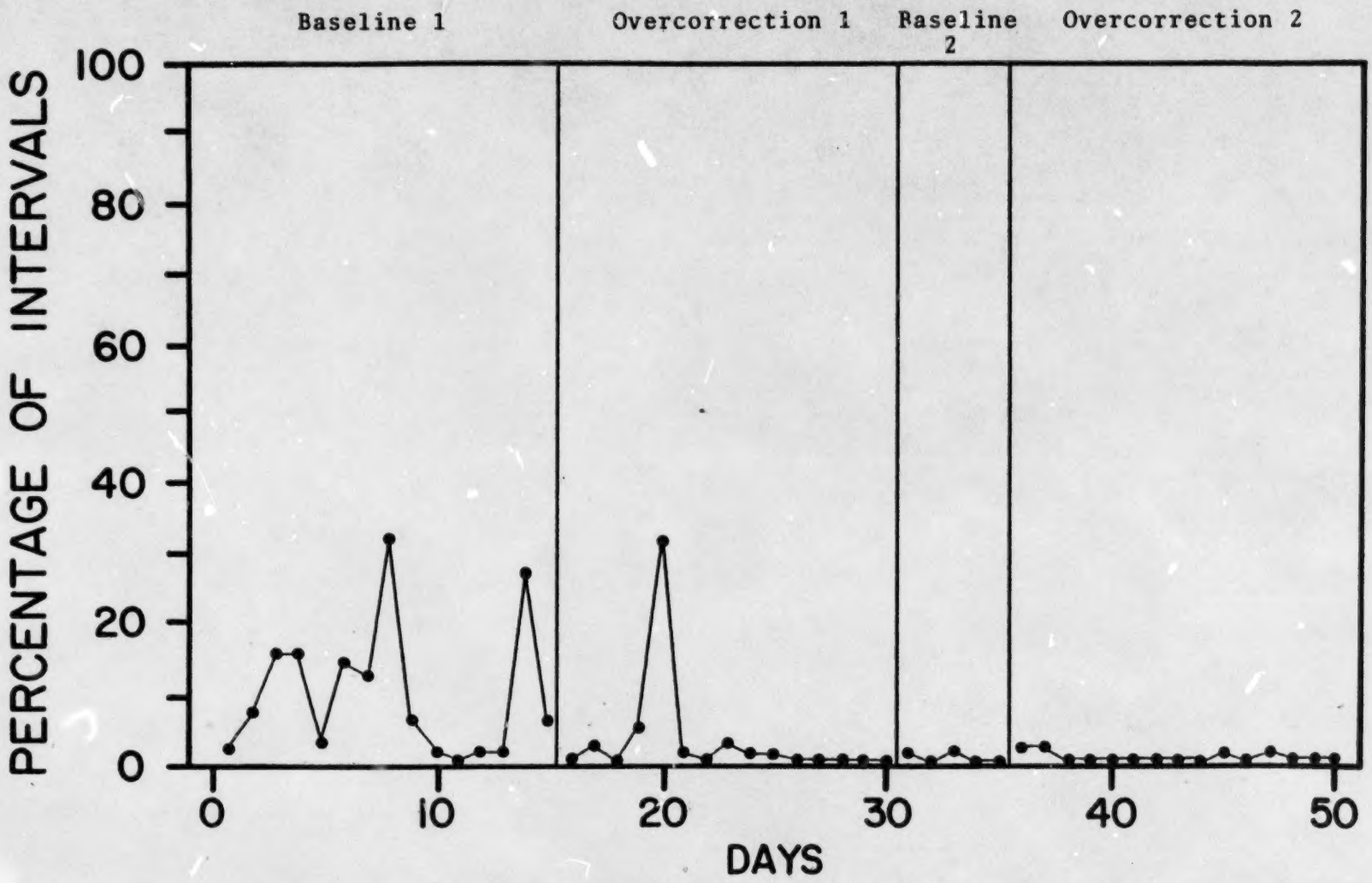

Figure 34. Percentage of the negative behavioral correlate, body-spinning, displayed across baseline and overcorrection conditions for subject 4

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Subsequent changes in conditions (baseline 2 and overcorrection 2) were associated with decreased percentages for body-spinning behavior. Table 6 shows non-significant differences for these last two changes.

Hypothesis XXXV examined the differences for the negative behavioral correlate, spinning objects. Figure 35 shows the percentages for this behavior across the four experimental conditions. Since the variance of data points across the different conditions was minimal, a time-series analysis was not conducted as shown in Table 6. Therefore, none of the changes can be considered significant.

Hypothesis XXXVI sought to determine the differences in the total negative behavioral correlates. Figure 36 displays the time-series observations for this behavioral category. During the initial baseline condition, this behavior averaged 15.4%. Total negative behavioral correlates decreased to a statistically significant degree ($p < .05$), as shown in Table 6, when overcorrection conditions were established. When overcorrection procedures were removed, this behavior dropped from 4.9% to 1.9%. The re-application of overcorrection conditions was associated with a slight increase to a mean of 2.7%. Table 6 shows that neither of these last two changes across conditions were significant.

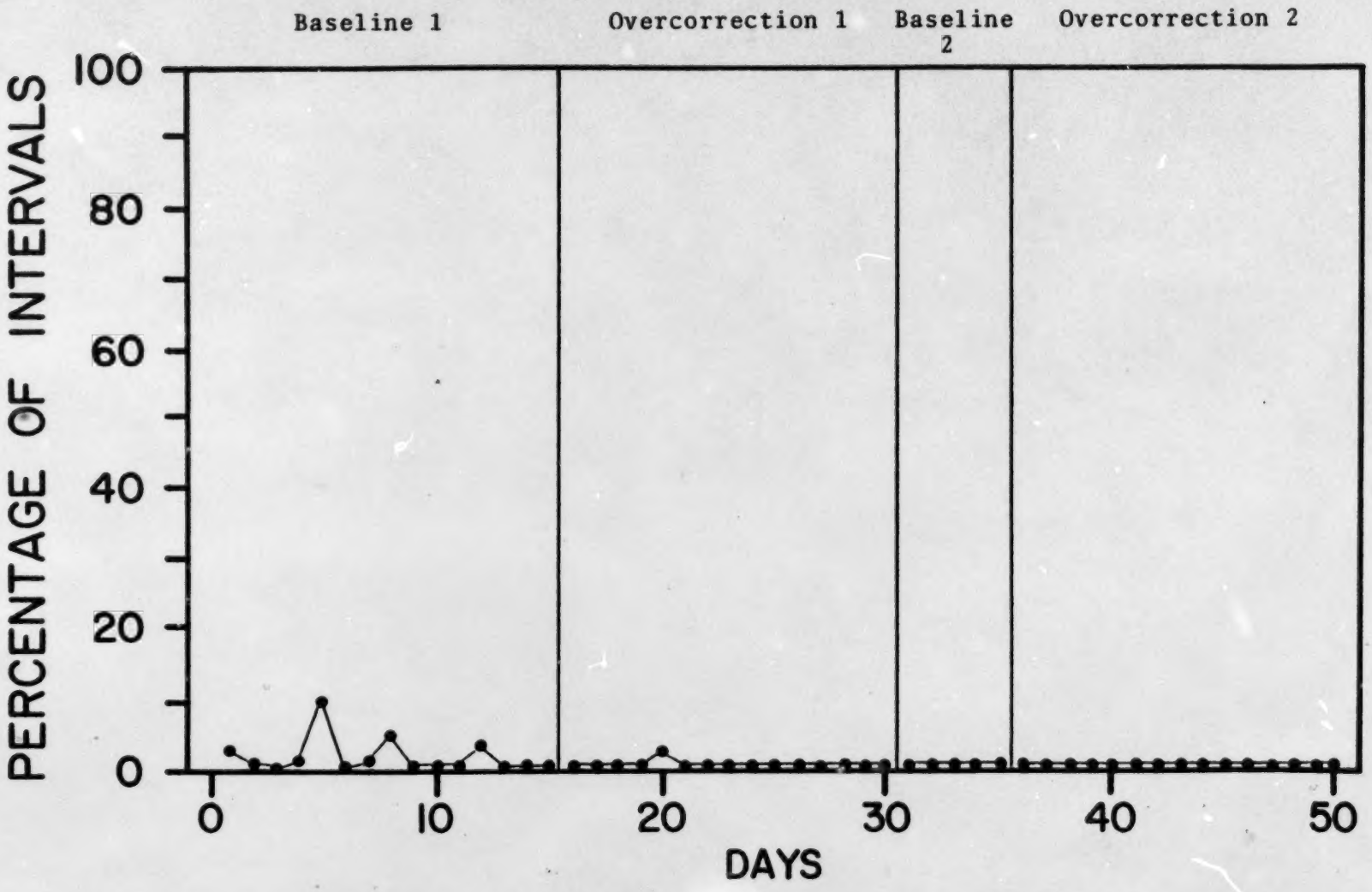

Figure 35. Percentage of the negative behavioral correlate, object-spinning, displayed across baseline and overcorrection conditions for subject 4

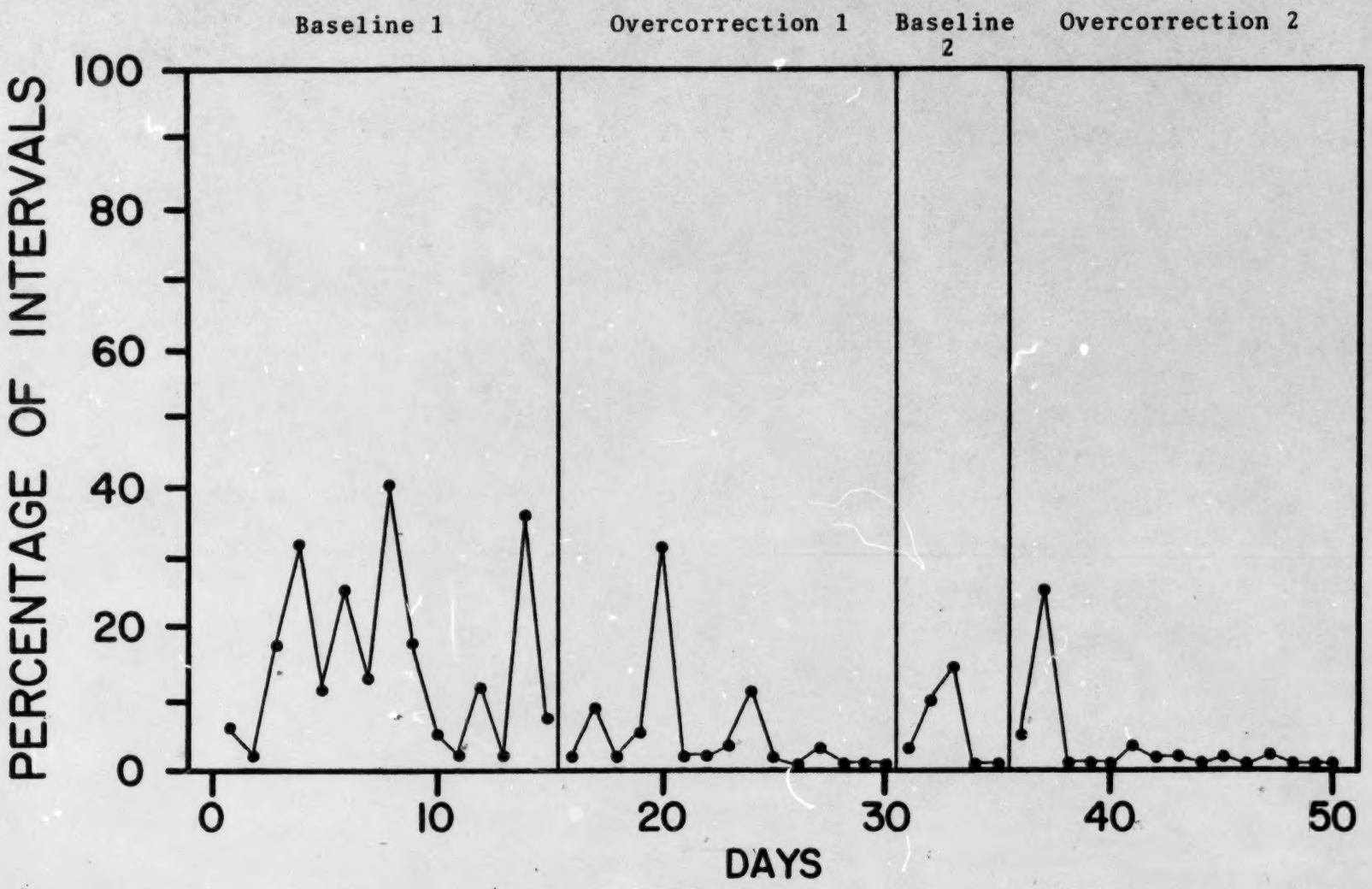

Figure 36. Percentage of the total negative behavioral correlates displayed across baseline and overcorrection conditions for subject 4

Walker Problem Behavior Identification Checklist

The Walker Problem Behavior Identification Checklist was administered twice to each of the parents. Standard scores were obtained during the first baseline condition and collected again following the final overcorrection treatment condition. Hence, pre- and post-test scores were obtained in order to determine if the parents noted any changes over the course of the study.

The test, which is composed of 50 behavior-oriented questions, yields scores for six categories: Acting-out, Withdrawal; Distractability; Disturbed Peer Relations; Immaturity; and a Total value. Figure 37 displays six charts, each representing one of the rated categories. All of the subjects' pre- and post-test scores are displayed on each chart.

A visual inspection of "Acting-out" differences reveals decreases of 15 to 35 standard scores for subjects 1 and 2, respectively. Since these two subjects were initially rated as the two most acting-out subjects, the fact that they were the two lowest at post-testing indicated marked improvements for each. While the score for subject 4 increased slightly, the post-test scores for subject 3 increased by 23 rating points. Hence, in terms of this rating category, only two subjects were seen by their parents as less acting-out.

The charts for "Withdrawal", and "Distractability" showed neither significant, nor systematic changes. Across

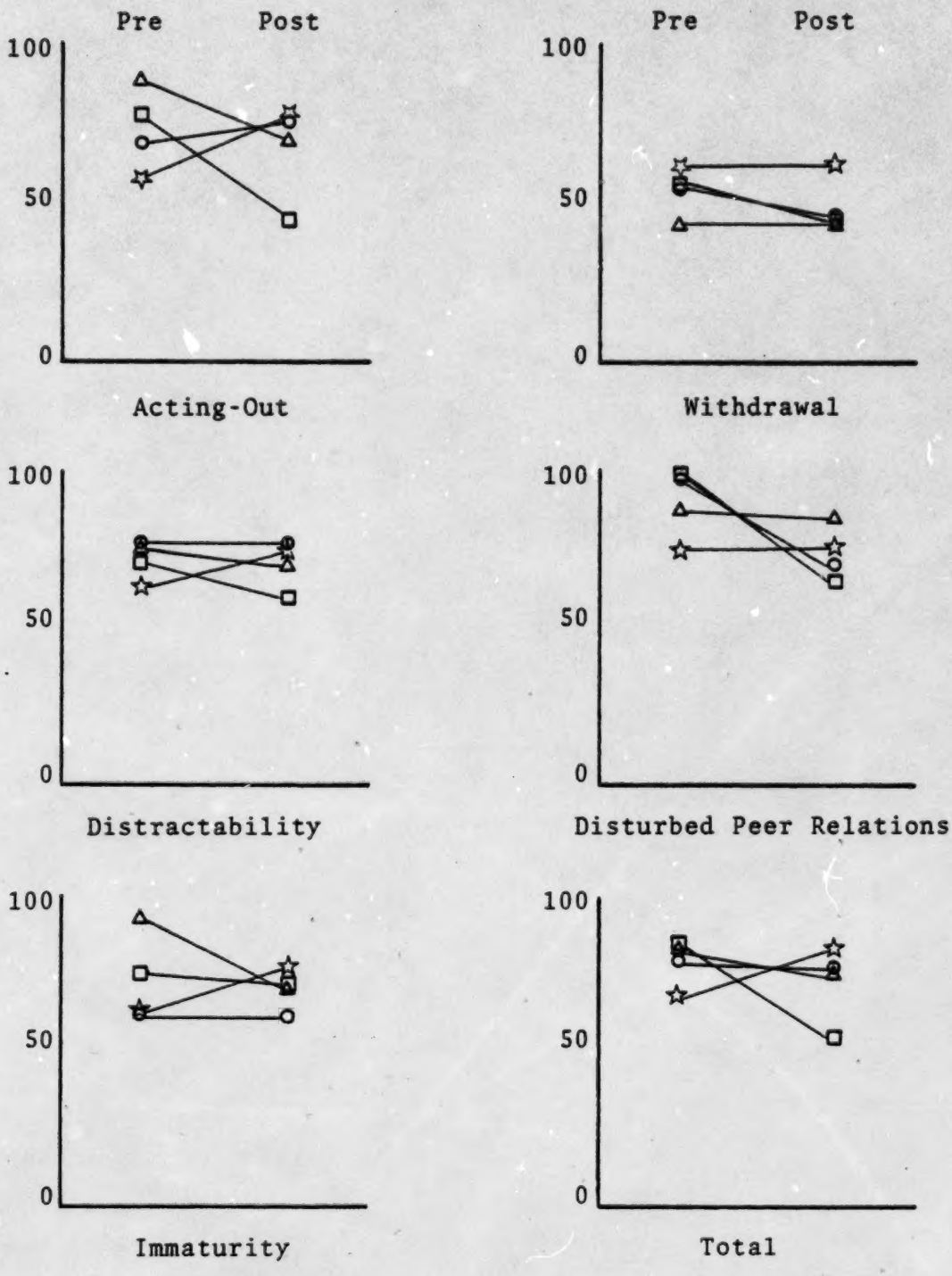

Figure 37. Pre- and post-test results from the Walker Problem Behavior Identification Checklist across the six subscales for all subjects expressed in standard scores. Subject 1 = △ ; Subject 2 = □ ; Subject 3 = ☆; Subject 4 = ○ .

pre- and post-testings, none of the parents reported marked changes in either rating category. However, measurements did show decreases averaging 7.0 and .75 standard scores for the Withdrawal and Distractability scales, respectively. Similarly, only minor overall changes were reported on the "Immaturity" scale. Only subject 1 was seen as being less immature by his parent. With respect to this scale, subject 1 was more homogeneous to the group upon post-testing. Subject 1 was also veiwed by his parent as less aberrant on all previous scales.

The majority of changes were noted on the "Disturbed Peer Relations" scale, the one most directly relevant to the major questions under examination in the present study. Three of the four subjects were rated lower upon post-testing. Subject 3 was rated slightly higher (4 points). However, the average decrease was 17.0 rating points when all subjects' scores were calculated. This decrease was more than twice that of any other scale. Specifically, the parents viewed their children as displaying fewer problems such as autistic verbalizations, talking-to-self, and stuttering.

In terms of the total rating scale, again the same three subjects were rated as less deviant. Subject 3 was rated as much more deviant, increasing from a total of 67 to 87 standard score points. However, the average of all scores showed a decrease of 10 points.

Summary

One hundred and two statistical comparisons were tested via computer-assisted time-series analysis programs. A two-tailed *t* test, using 46 degrees of freedom and a critical *t* value of 2.013, was employed to evaluate each of the data comparisons at the .05 level of confidence. Of the total number of possible comparisons, 45 or 44.1% were shown in Tables 3 through 6 to be significantly different. All 12 comparisons regarding the self-stimulatory target behaviors for the four subjects were found to be statistically different ($p < .05$). Across the four subjects, three identical positive behavioral correlates were specified for each. Since there were three comparisons for each behavior for each subject, a total of 36 comparisons were possible. As a group, 11 of these comparisons, or 30.6% were significantly different ($p < .05$). Similarly, 43.3% of the tests performed on the negative behavioral correlates were shown to be significant ($p < .05$). Time-series analyses performed on the data from the behavioral categories, total positive and total negative behavioral correlates, showed that in both cases, 25% of the comparisons were different ($p < .05$).

An analysis of the comparisons between the baseline 1 and overcorrection 1 conditions for all four subjects showed that 70.6% of these were statistically significant ($p < .05$). Of the tests performed on the second comparison between overcorrection 1 and baseline 2 conditions, 29.4% were found to

be significantly different ($p < .05$). In the final comparison between the baseline 2 and overcorrection 2 conditions, 32.4% were significant ($p < .05$).

For subjects 2 and 4, the negative behavioral correlate, object-spinning, was excluded from the analysis, for reasons stated earlier. Therefore, of the original 36 hypotheses, only 34 were subjected to statistical evaluation. Three data comparisons were conducted for each of these 34 hypotheses. In 28 of the 34 hypotheses, at least one comparison was found to be significantly different ($p < .05$). From this perspective, the rejection rate was 82.6% that some change in excess of chance occurred within each hypothesis.

The results of the Walker Problem Behavior Identification Checklist showed additional support for the decreases in the target behaviors associated with overcorrection treatment. Each of the six subtest scales showed decreases of varying degrees. However, the majority of changes were noted on the "Disturbed Peer Relations" scale, the one most directly relevant to the major questions under investigation in the present study. Three of the four subjects were rated lower upon post-testing. Subject 3 was rated slightly higher by his parent. Nonetheless, the average decrease was 17.0 rating points across the four subjects. In terms of the total rating scale, again the same three subjects were rated as less deviant. However, for all subjects, the average decrease was 10.0 rating points.

CHAPTER V

SUMMARY AND DISCUSSION

Summary

There were four objectives investigated in this study. The first objective sought to determine the degree to which parents of severely emotionally disturbed children could apply behavioral intervention techniques with their own children in home settings. The second objective was to investigate the effects of these procedures on various self-stimulatory behaviors. The third objective was to study the relationship between changes in the target behavior with the changes in specific untreated behaviors of a positive nature. Similarly, the fourth objective sought to determine the relationship between changes in the self-stimulatory target behaviors and changes in specific, untreated behaviors having a negative character.

Four elementary school age children and their parents participated in the study. The subjects were enrolled in a special education project serving the educational and social needs of severely emotionally disturbed children and adolescents in a public school setting. For each subject, a specific self-stimulatory behavior was identified as the target behavior to which treatment would be applied. These behaviors were object-rolling, hand-wringing, hand-flapping and repetitive verbalizations. Additionally, three positive behavioral

correlates, proximity, playing appropriately, and head-orientation, were operationally defined for each subject. Three negative behavioral correlates, such as throwing, object-spinning, body-rocking, jumping, and inappropriate verbalizations, were also identified for each subject.

Each of these behaviors was observed throughout an A-B-A-B experimental design. Time-sample recordings were obtained on weekdays only in the respective home settings by an independent observer. During treatment conditions, the parents applied specific overcorrection procedures to decrease the self-stimulatory target behaviors of their children. In three of the cases, overcorrection procedures consisted largely of functional hand movements (cf. Foxx, 1971; Foxx & Azrin, 1973). That is, the parent would observe the target behavior occurring; provide a verbal warning; and then give a series of verbal commands, calling for the hands to be moved in specific positions, such as straight out in front of the body, down as the sides, in the pockets, on a flat surface, or straight out at the sides of the body. If the child resisted, manual guidance was used. This procedure involved the parent physically, and firmly assisting the child to perform the requested hand movements. As resistance decreased, the amount of parental guidance was gradually faded. Since 12 verbal commands were given during each treatment, each lasting 15 seconds, a total of 3 minutes was required per treatment. With one of the subjects, an additional procedure, oral hygiene (cf. Barnard et al., 1974; Foxx, 1971),

was used when the topography of the behavior required it. When hand-wringing was associated with the mouthing of fingers, then the hands were washed; the teeth were brushed with an oral antiseptic; and facial lotion was massaged into the mouth and lip areas of the face. This specific addition to the treatment package was used very infrequently. Since it required an extra 2 minutes to apply, a total of 5 minutes was required for treatment in these instances. A hand-over-mouth procedure (cf. Newman et al., 1977) was used to treat the repetitive verbalizations of the fourth subject. Following a verbal warning, the parent approached the subject and applied this treatment which lasted a minimum of 30 seconds. If the subject continued to verbalize, the duration of the treatment was extended so that the last 5 seconds were characterized by the child being quiet. With this subject, the techniques of manual guidance and fading were also employed as necessary.

The results of the study were analyzed using computer assisted time-series analysis programs, developed by Bower et al. (1974). Statistical comparisons between the means of behaviors from adjacent experimental conditions were used to evaluate the significance of changes. The findings showed supportive evidence for the first two objectives. First, parents were shown to be effective agents for behavior change with their own children. In every instance, when parents applied overcorrection procedures, decreases in self-stimulatory target behaviors were recorded. The second objective

was to determine the effects of overcorrection procedures for treating self-stimulatory target behaviors. The results indicated that all four target behaviors were effectively decreased when treatment was applied in the homes by parents. An analysis of the data indicated that all comparisons between baseline and overcorrection conditions were statistically different. These findings are consistent with those of earlier studies (Barnard et al., 1974; Simpson & Swenson, 1978). In each of these studies, as in the present investigation, parents have demonstrated the ability to effectively implement overcorrection procedures with their own children.

Across the four subjects, the data seemed to indicate that head-orientation behavior was most sensitive to changes in the self-stimulatory target behaviors. Head-orientation and the various target behaviors formed an inverse relationship. That is, when target behaviors were suppressed using overcorrection procedures, this positive behavioral correlate increased significantly. The other positive behavioral correlates, proximity and playing appropriately, occasionally showed significant relationships with changes in the target behavior, but always tended towards increased levels during overcorrection treatment conditions. Evaluated as a group, the total positive behavioral correlates for all subjects tended to evidence this inverse relationship, as well.

Finally, the fourth objective sought to determine the relationship of negative behavioral correlates to changes in the self-stimulatory target behaviors. Most of these

specified, yet untreated, behaviors were different across the four subjects. However, 14 of the 30 possible comparisons between experimental conditions were found to be statistically different. Most of these significant changes occurred across the first comparison between the first baseline and the overcorrection 1 condition. Thereafter, many of these behaviors remained at relatively low mean levels. Although the data were not conclusive, the trend seemed to be directed towards a positive relationship. That is, when the self-stimulatory target behaviors were decreased using overcorrection procedures, the negative behavioral correlates tended to decrease in similar fashion, albeit some of these changes were non-significant. A similar data relationship was apparent when the negative behavioral correlates were examined as a group.

To varying degrees, the four stated objectives for the study were eventuated with positive results. It was shown that parents can effectively apply overcorrection procedures in their homes to decrease the self-stimulatory target behaviors of their severely emotionally disturbed children. Moreover, the application of overcorrection treatment was shown to be associated with increases in positive behavioral correlates, and with decreases in negative behavioral correlates. The evidence suggests that overcorrection treatment is more than casually associated with positive therapeutic gains for this target population.

Discussion

For each of the four subjects, a self-stimulatory target behavior was identified, and manipulated throughout the (A-B-A-B) experimental design. Hypotheses 1, 10, 19, and 28 related to these behaviors for subjects 1 through 4, respectively. Each of these four hypotheses involved three statistical comparisons which were subjected to evaluation via a computer-assisted time-series analysis program (Bower et al., 1974).

For subject 1, the self-stimulatory target behavior was object-rolling. The application of functional hand-movements, a positive practice overcorrection procedure contingent on the occurrence of this target behavior, was provided by his parent during intervention conditions. As revealed in Table 3, and displayed in Figure 1, this target behavior was significantly changed across all three data comparisons. That is, overcorrection procedures served to significantly decrease the percentage of occurrence of this behavior during the first treatment condition. A significant increase was noted in association with the second baseline condition. Finally, object-rolling was reduced significantly during the last overcorrection condition.

Hand-wringing served as the self-stimulatory target behavior for subject 2. Changes in this behavior also seemed to be highly related to the applications of restitutional and positive practice forms of overcorrection. As Table 4

indicated, and as Figure 10 displayed, this behavior changed significantly at each of the three data comparison points.

A positive practice overcorrection procedure, functional hand movements, was used to treat the hand-flapping behavior of subject 3. All three of the comparisons, as revealed in Table 5 and displayed on Figure 19, proved to be significantly different.

For subject 4, a hand-over-mouth procedure was employed by his parent in the home setting to treat repetitive verbalizations, the self-stimulatory target behavior. An analysis of the three comparisons across the experimental conditions, as shown in Figure 28, and as revealed in Table 6, indicated significant changes in each instance.

Significant changes in the four self-stimulatory target behaviors were associated with the differing conditions of the experiment. When overcorrection procedures were applied by parents, subsequent and immediate reductions in the target behaviors were noted. Accordingly, when reversal conditions were established, the levels of deviant, self-stimulatory target behaviors returned to those noted before treatment (i e., during the initial baseline condition). To further demonstrate the influence of the overcorrection procedures applied by parents, a final treatment condition was implemented. Again, all four target behaviors were effectively and efficiently diminished to the levels witnessed during the initial overcorrection conditions. Each of the experimental manipulations gave added significance to the

effects exerted by the treatment variable, overcorrection. Moreover, these findings demonstrate that parents can be effective agents for behavior change with their own severely emotionally disturbed children.

Kerlinger (1970), and Minium (1970) have asserted that there is a vast difference between changes in human behavior that are significant from a statistical and a practical view point. For example, when treating behavior disorders in children, a statistically significant difference of 50 percentage points is meaningless if the target behavior continues to occur a rate of 40 or better percent. However, if the same reduction of 50 percentage points results in the target behavior occurring only 2 to 10% of the time, then the observed change in human behavior may be considered as both statistically and practically significant.

In the present study, it was shown that overcorrection procedures applied by parents to the self-stimulatory target behavior of their severely emotionally disturbed children was instrumental in producing statistically significant differences as demonstrated via time-series analysis procedures. For subject 1, object-rolling behavior was reduced from a high to 39% to a low of 2.4% during the overcorrection treatment conditions. Hand-wringing reached 6.3% during treatment for subject 2. Similarly, hand-flapping behavior attained an average low of 4.9%. Finally, the target behavior, repetitive verbalizations, for subject

4, reached 11.5% during the overcorrection treatment conditions applied by his parent. In the last instance, for example, a reduction of over 64 percentage points was associated with the application of the treatment variable.

Etiological explanations of severe emotional disturbance and related behaviors are numerous and have passed through periods of disrepute and popularity (Kauffman, 1974). Although several theoretical propositions have been documented by empirical research, many explanations are impressionistic and have eluded rigorous scientific varification. Because assumptions and relationships are often vague and stated in imprecise terms, many researchers have not attempted to align their treatment procedures too strongly with any one single theory. In fact, this may be impossible as the more frequently cited theories are not mutually exclusive and thus tend to have considerable overlap. As categorized by Baumeister and Rollings (1976), the theories fall into five general categories. They are: homeostatic; psychodynamic; organic; developmental; and learning. Unfortunately, the first four theoretical orientations are very difficult to systematically demonstrate. And, since the present study is founded upon the application of the principles of behavior, the last theory on learning should serve as the primary basis from which to describe the results of this study. A survey of the literature suggests that the most adequately documented treatments arise from studies from instrumental or operant conditioning

researchers. Skinner (1953) originally suggested two distinct approaches to the explanation of self-stimulatory behavior. Derived from learning principles, the avoidance hypothesis, and the discriminative stimulus hypothesis have been advanced to describe self-stimulatory and self-injurious behavior.

According to Baumeister and Rollings (1976), self-stimulatory or self-injurious behaviors may function as response mechanisms by which the organism might avoid more aversive events. Tension, anxiety, or fear associated with specific environmental events may be reduced if such behavior results in avoidance or escape. The reduction of drives such as these was referred to as reinforcement (Hull, 1943). Accordingly, the role of "negative reinforcement" is strengthened in situations when even self-destructive forms of behaviors tend to terminate, escape, or avoid a presumably more aversive situation. The word "presumably" is open to multiple interpretations, yet it is important to the theory whether such a situation can be demonstrated to exist or not. Furthermore, whether an aversive situation is uncovered, its existence to the organism is all that is meaningful.

Green (1968) found a significant relationship between physical abuse in the first two years of life, and later head-banging behavior in schizophrenic children. Bucher and Lovaas (1968) reported high rates of self-stimulation when restrained individuals were released or when exposed to social contact. According to Baumeister and Rollings (1976), "this is not at all an uncommon phenomenon" (p. 11).

In the present study, a set of three negative behavioral correlates were identified and observed along with the target behavior for each subject. During overcorrection treatment conditions, it was noted that these negative behaviors decreased or remained unchanged in over 95% of the time. According to the avoidance hypothesis, these behaviors should have increased in order to avoid or escape treatment. No support can be given this theoretical postulate in view of the findings.

Perplexing as it seems, painful self-injurious responses can serve as a self-generated discriminative stimulus which is associated with positive reinforcement (Skinner, 1953). In psychodynamic terms, this is known as "secondary gain". Lovaas and Simmons (1969) speculated that sensations such as pain associated with self-stimulation can become discriminative to the onset of social reinforcers such as adult attention. Contingent adult attention compared with no attention has been associated with increases in self-stimulatory response levels.

The context of specific environmental situations may be related to the occurrence of self-stimulatory behavior. In analogue terms, chronic schizophrenic females have been trained to produce an aversive noise when it was paired with reinforcement (Ayllon & Azrin, 1966). As the aversive noise began to assume reinforcement properties, its environmental precedent stimuli also acquired discriminative characteristics.

Much evidence suggest that self-stimulation is main-

tained through social reinforcers. This agrument is characteristically circular as self-stimulatory behavior is also viewed as discriminatory to social rewards. Baumeister and Rollings (1976), and others assert that, in many cases, self-stimulatory behaviors are maintained by instrumental conditioning. However, the "genesis of the behavior may be quite a different matter" (p. 16).

Although this hypothesis can not be supported given the data in this study, it appears more plausible than the previous avoidance hypothesis. By inference, the removal of social attention during periods of self-stimulation would place the subject in an extinction conditon. In addition, the target behavior, previously maintained by positive reinforcement, would gradually diminish. Overcorrection procedures tend to create an extinction condition because the subject is engaged in the positive practice procedure for some length of time. All of the target behaviors were effectively decreased using overcorrection. Thus, some evidence is offerred to support this stimulus discriminative hypothesis.

Overcorrection, by design, is intended to serve two functions. First, when it is applied contingent upon the occurrence of an undesirable behavior, the frequency of this target behavior is expected to be reduced. According to Skinner (1938), this relationship constitutes the operational definition for punishment. Thus, only the results that are associated with the application of a treatment procedure can define its nature. In the context of the present study, the

overcorrection procedures applied by parents to self-stimulatory behaviors of severely emotionally disturbed children can be described as punishment. In each case, overcorrection served to decrease the frequency of the target behavior to which it was applied.

Second, overcorrection is intended to contain educative characteristics. That is, positive practice overcorrection is designed to teach the adaptive behavior which is overly practiced during treatment. According to Skinner (1938), if the procedure serves to increase the frequency of a behavior which is closely associated with its presentation, then the process may be called reinforcement. As with punishment, this process may only be defined by examining the results of the treatment procedure. In the present study, no data are offerred as evidence that overcorrection contains reinforcing properties. That is, no data were obtained on the practiced behaviors, functional hand movements, to either support or refute this conclusion. Only one other study (Wells et al., 1977) has examined this possible property of overcorrection treatment. These researchers demonstrated that the practiced behavior, appropriate toy playing, was acquired by one subject, but not by the other. Both subjects were identical twin boys who were diagnosed as schizophrenic. The results of the present study should not be interpreted to either support or disprove the notion that overcorrection procedures can be reinforcing. Since no observations were recorded relative to this question, the reinforcing properties

of overcorrection must be left to future research.

Behavioral correlates, and side-effects are equivalent terms meaning behaviors that hold some relationship to the treatment and the target behavior. In the present study, numerous behaviors, having positive and negative connotations, were identified and observed in relation to changing experimental conditions. Since these behavioral correlates were simply observed and not subjected to treatment interventions, a free-operant state existed for each. As such, these behaviors were free to vary in relation to the effects associated with the treatment variable, overcorrection. For example, a positive behavioral correlate may assume a direct, or inverse, or no relationship with changes in the treated behavior. Similarly, negative behavioral correlates could vary in like fashion. Ideally, a behavioral correlate identified as being positive and adaptive would increase in direct relation to decreases in the treated behavior. On the other hand, behavioral correlates defined as being negative and maladaptive would decrease in direct proportion to reductions in the target behavior. Should both of these relationships become manifest with the changes in the target behavior, then the treatment would be given additional significance.

Early studies, investigating the effects of overcorrection procedures (Foxx, 1971, Foxx & Azrin, 1972, 1973), have reported that adaptive and positive changes in untreated behavior have been associated with reductions in the self-

stimulatory target behaviors. However, these reports were largely offerred in anecdotal fashion in the literature. Increased eye-contact, responsiveness to adults, academic productivity, and socialization skills have all been suggested as by-products of overcorrection treatment. In subsequent studies (Epstein et al., 1974; Simpson & Swenson, 1978), the relationship between increases in positive, adaptive behaviors and decreases in self-stimulatory behaviors has been more empirically demonstrated.

In the present study, three identical sets of positive behavioral correlates were operationally identified for each of the four subjects. Throughout the study, these behaviors were observed simultaneously with the respective self-stimulatory target behaviors. Across baseline and overcorrection conditions, the positive behavioral correlates and the target behaviors were observed to determine any possible functional relationships.

One of these behaviors was proximity. An examination of the results showed that this behavioral correlate increased when the overcorrection 1 conditions were implemented for the four subjects. In two cases, this increase was significantly higher than the baseline 1 condition. Azrin and Holz (1966), Skinner (1953) and others have commented that punishment procedures may cause the individual to avoid not only the physical situation, but also the person applying the treatment. The use of overcorrection as a punishing procedure to reduce self-stimulatory behaviors in this study was not associated with

an avoidance of the parents applying the treatments. This evidence seems to refute the avoidance hypothesis since physical closeness to others increased during overcorrection treatment. Concurrently, support may be inferred for the discriminative stimulus hypothesis. It is suggested that increased proximity is associated with an enriched possibility for personal and social reinforcement. In this sense, it is possible that other people in the immediate physical environment could have become discriminative for reinforcing events.

The second positive behavioral correlate was operationally defined for each subject as playing appropriately. Although Wells et al. (1977) showed that this behavior could be acquired when practiced as part of the positive practice overcorrection sequence, no studies have considered this behavior as a positive side-effect of treatment. Playing appropriately is especially important because severely emotionally distrubed tend to be extremely deficient in this aspect of childhood development (Kauffman, 1974). In the present study, playing appropriately increased for all subjects when the overcorrection conditions were established. Two of the four changes across the first baseline and overcorrection conditions were statistically significant.

The third positive behavioral correlate was head-orientation. For all four subjects, this behavior was found to increase significantly across the baseline 1 and overcorrection 1 conditions. Throughout the remainder of con-

ditions, this positive behavioral correlate tended to either maintain high levels or increase with the application of overcorrection procedures. The consistent positive changes in head-orientation behavior was seen as important requisites for the acquisition of new behaviors. Baumeister and Rollings (1976) explained this phenomenon saying, that "collateral behavior changes of this nature may result from a conditioning history in which the child has learned to avoid aversive consequences by attending to adults" (p. 23).

Not all of the statistical comparisons involving the three positive behavioral correlates for the four subjects were found to be significantly different. However, appropriate and desirable gains in all positive correlates were recorded for all subjects throughout the study. It should therefore be concluded that the application of overcorrection procedures tends to be associated with increases in the positive behavioral correlates involved in this analysis.

The positive behavioral correlates category included all of the individual positive behavioral correlates identified for the four subjects. If any of the three individual behavioral correlates were observed during the particular interval, this category was marked. One, two or three of these behaviors could be recorded during the same interval; and yet, the subject was only given credit for displaying one single unit of positive behavior. Hence, recordings in this behavioral category would simply indicate that some positive behavior occurred during the particular interval of observa-

tion. None of the previous studies have investigated the positive side-effects of overcorrection treatment as an aggregrate of similar responses.

The results showed that significant increases occurred in this behavioral category when the overcorrection 1 condition was implemented for all subjects. Two of the four increases were statistically different. All of the remaining condition changes were associated with either equivalent or increased levels of this behavioral measurement. Thus, as with the individual positive behavioral correlates, there seems to be a strong relationship between treatment and increases in some dimension of the four subjects' positive responses.

When considering the relationship between negative, undesirable behaviors occurring concurrently with other negative behaviors to which treatment is being applied, two issues come to the surface. Both must be examined critically. The first issue arises out of the "symptom substitution" notion advanced by psychotherapists (Brenner, 1955). This notion suggests that if behavior disorders are suppressed without attacking the underlying pathology, then other negative "symptoms" will most probably surface to replace the suppressed behavior. Although behavioral researchers have not acknowledged this association, much of their research has been influenced by the symptom substitution notion. For example, the focus of research regarding the side-effects of overcorrection procedures for the treatment of self-

stimulatory behaviors has been directed toward whether or not negative behaviors increase in relation to decreases in treated target behaviors. Epstein et al. (1974) showed that inappropriate foot movements occurred when overcorrection suppressed the self-stimulatory target behavior in one subject. No such relationship occurred with another subject. Doke and Epstein (1975) found similar results using overcorrection procedures.

In the present study, a total of 12 negative behavioral correlates were identified, three for each of the four subjects. Since these behaviors were simply observed, and not treated, throughout the experimental design, the variations in these behaviors could be associated with different experimental conditions. Because there were two overcorrection conditions associated with each of these behaviors, there was a possibility of 24 opportunities for symptom substitution to occur. In 23 or 95.8% of these cases, the respective negative behavioral correlates showed decreases or no changes from an initial low level when the treatment conditions were established. In the one exception, inappropriate verbalizations for subject 1 increased significantly during the overcorrection 1 condition. However, this same behavior decreased significantly during the second overcorrection condition, leaving the level of this behavior approximate to that observed in the baseline 1 condition. This finding corresponds to the data reported by Rollings et al. (1977). Thus, no appreciable changes took place with this negative behavioral correlate over the course

of the study. Object-spinning for subjects 2 and 4 were not evaluated via time-series analysis methods since these two behaviors either failed to occur, or occurred at such low frequencies that tests were inappropriate. Yet, if symptom substitution was to occur during treatment conditions, it may have been manifest in these two behaviors. As the data show, this was not the case. Therefore, a case for symptom substitution associated with the application of overcorrection procedures can not be supported given the results of this study.

A second notion suggests that other behavior, in addition to the target behavior may be subject to influences from the treatment variable. According to this point of view, decreases in a target behavior may be associated with decreases in other undesirable responses. A review of the literature shows that this behavioral aspect has received little systematic attention in conjunction with the use of overcorrection procedures for self-stimulatory behavior. The present investigation sought to determine if this relationship was associated with overcorrection treatment. Across the four subjects in this study, negative behavioral correlates were identified and observed, but not treated. Fourteen of the 30 tested comparisons between experimental conditions proved to be significantly different. The remainder of the negative behavioral correlates either were stabilized or tended to decrease, though not significantly. This evi-

dence permits a tentative conclusion. That is, with the application of overcorrection to decrease self-stimulatory target behavior, there is a concurrent decrease in other, untreated negative or undesirable behaviors. In reinforcement terms, it may be stated that interactive characteristics of parent-child relations tend to be associated with generalized punishing conditions for not only the target behavior, but also the negative behaviors that are temporally and operationally close to the target behavior. This type of conclusion lends itself to the notion that topographical behavior or behaviors that are temporally related are most sensitive to influences exerted by the treatment variable, overcorrection.

An analysis of topographical similarities between the self-stimulatory target behavior for each subject and the three identified negative behavioral correlates shows very little relationship. Thus, sameness in behavior topography was probably not the variable to which changes in the negative behavioral correlates can be attributed.

The individual recordings for each subject were analyzed in terms of temporal proximity between target behaviors and negative behavioral correlates. It was found that in an average of 30.7% of the intervals in which the target behavior occurred, negative behavioral correlates also were observed. When the temporal proximity was increased to at least two 15-second intervals before the interval in

which treatment was applied, the percentage of temporal association rose to an average of 47.4%. Hence, in almost 50% of the occasions in which the target behavior occurred, one or more of the negative behavioral correlates was also observed. Within this temporal context, it may be seen that many of the negative behavioral correlates were closely associated with the application of overcorrection treatment, and may have been subject to its punishing influences.

The total negative behavioral correlates category included all of the negative behavioral correlates identified for each of the four subjects. If any of the three individual behavioral correlates were observed during a particular interval, this category was marked. One, two or three of these behaviors could be recorded during the same interval, and yet, the subject was only given credit for displaying one single unit of this negative behavior measurement. Hence, recordings in this behavioral category would simply indicate that some negative behavior occurred during the particular interval of observation. None of the previously cited studies investigated the negative behavioral side-effects of overcorrection treatment as an aggregate of similar responses.

The results showed that statistically significant decreases occurred in this behavioral category for three of the four subjects when the overcorrection conditions were implemented. For subject 1, this measurement category actually increased significantly when compared to the first

baseline condition. But, by the end of the study, this behavior was reduced to a level comparable to the baseline 1 condition. As with the three negative behavioral correlates, the results tend to support the notion of temporal proximity. That is, by virtue of the fact that many of these negative behavioral correlates occurred during or slightly before overcorrection treatment was applied, a generalized punishing effect resulted.

The results of the Walker Problem Behavior Identification Checklist showed two notable findings. First, all of the individual rating scales revealed average decreases for the four subjects. Since this test instrument contains only scales related to childhood behavioral disorders, the general decrease across all individual scales is seen as highly positive. By inference, the subjects were perceived by their parents as being less deviant upon post-testing after the study had concluded. Second, when the individual scales were combined, a total scale score was derived. This scale also showed average decreases for the four subjects. Upon post-testing, a decrease of 10 standard score points was noted for all subjects. Thus, as a group, the children were seen by their parents as displaying improved behavior.

This rating test tended to show improvement in behavior as perceived by the parent. Typically, a decrease in the rated behaviors denotes such improvement. However, as Figure 37 shows, subject 3 was rated higher on the acting-out, and disturbed peer relations scales. Hence, his total

score was greatly elevated. It can also be seen that pre-test scores for subject 3 were lower than those for the other subjects on five of the six rating scales. Upon final testing, the total scores for subject 3 were higher than the others. According to his parent, these changes were highly desirable. The overt behaviors which he began to exhibit and which increased his scores, particularly on the acting-out, and disturbed peer relations scales, were seen as positive gains for this subject. The parent interpreted these increases in behavior as the subject's attempts to more actively express his feelings, something almost totally void in the subject's behavioral repetoire prior to the study.

Limitations of the Study

Depending on the theoretical orientation of the reader, the limitations and procedural faults in this study will vary considerably. However, the selection of subjects in this experiment was perhaps the most limiting factor. Because the subjects were not drawn from a larger or general population, the interpretability of the results is limited. Even though only four subjects were selected, this small group represented a unique population, one defined more by the special behaviors under study, and by the uniqueness of the psychiatric diagnoses given the subjects, than by the sheer size or number of subjects involved.

In retrospect, the selection of the positive and negative behavioral correlates could have been on a more systematic basis. In this study, these behaviors were arbitrarily selected by agreement between the experimenter and the parents. In lieu of this, an observation method is suggested. From a population of identified behaviors, the sample could be drawn after recording their frequencies for at least 1 week. The sample would thus consist of those behaviors which occurred most frequently.

The training of parents was accomplished individually and was not associated with a specific set of instructions or criteria for determining that proficiency was achieved. Hence, a need for these additions is seen as important in the development of future research regarding parent training.

In a study involving a reversal to baseline conditions, it is necessary to determine if environmental conditions or events in the first baseline closely approximate those in the second baseline condition. In this study, no procedures to assure or determine this equality were used. Thus, when using a complex procedure such as overcorrection, it is very difficult to ascertain if the parents acquired and used portions of the procedures at experimentally incorrect times. With this added experimental control, more credibility could be given to the changes in behavior during a second application of the treatment procedures.

Four procedural limitations have been described, each one of which would probably have enhanced the experimental controls imposed during this experiment. Thus, increased reliability would have been gained, and the results could possibly be more widely applicable.

Implications for Future Research

It has been commonly said that research should ask as many questions as it answers. Although numerous experimental hypotheses were pursued and answered in the present research, many more still remain to be investigated.

For the special educator, it is probably important to have precise information regarding the relationship between reductions in self-stimulatory behavior via overcorrection procedures and academic performances on educational tasks. Kauffman (1974), Newman et al. (1977), and Simpson and Sasso (in press) have anecdotally reported that decreases in self-stimulatory behavior were associated with increases in academic performance. However, no one has systematically investigated this relationship in connection with overcorrection procedures applied to self-stimulatory behaviors. More research is needed in this area of inquiry.

The positive practice overcorrection procedure was applied to the behavior of three of the four subjects. This procedure involved the subject having to respond to a series of functional hand movement commands given by the parent.

According to Foxx (1971), this procedure is intended to be educative. That is, adaptive behaviors are taught to the subject via this method. From a review of research dealing with overcorrection, only one study has attended to this variable. Wells et al. (1977) observed that the behavior involved in the positive practice procedure was acquired by one of the two subjects participating in the study. In the present study, no attempts were made to determine if the subjects learned to use their hands more appropriately, and in an adaptive manner. Additional investigation is required to examine the educative effects of the positive practice overcorrection procedure.

Although overcorrection procedures have been reported effective with many self-stimulatory behaviors, two instances, both involving head-weaving behavior, have been reported to be unsuccessful (Barnard et al., 1974; Rollings et al., 1977). The question arises regarding whether both the restitutional and positive practice portions of the overcorrection procedure should be implemented with specific self-stimulatory behaviors. The study of the order effects of overcorrection treatment has not been given adequate research attention.

The issue of maintaining the suppression effects obtained from overcorrection treatment has been reported previously, but only in vague terminology. In the present investigation, procedures for maintaining the treatment

effects of overcorrection were not specified. There may be a need to conduct overcorrection procedures on a particular schedule of application. Or, once complete suppression has been achieved, is there a need for further treatment? Azrin and Holz (1966) have suggested this may not be necessary.

More extensive research is required to respond to the generalization of effects question. Several studies have investigated this issue and arrived at equivocal conclusions. More information is needed about the effects of overcorrection procedures on self-stimulatory behaviors across physical locations, and times, and with the different persons applying the treatment procedures.

In the present study, two of the four subjects had similarly handicapped siblings living with them in the home environments. The effects of having a handicapped sibling were not investigated in this study, but there is a possibility that a relationship exists that could be influential in determining the feasibility of change with a specific subject. The implications could suggest that the sibling's behavior be treated differentially with that of the target subject. Or, the effects of treatment could be related to the presence of a handicapped sibling in the home.

Conclusions

There are three general conclusions that can be stated from the results of this study. First, it can be

stated that parents are capable in applying overcorrection procedures with their own severely emotionally disturbed children. All of the self-stimulatory target behaviors were significantly decreased using these treatment procedures. Therefore, it can be stated that overcorrection procedures are associated with significant treatment effects on self-stimulatory target behaviors such as the ones examined in this experiment.

The second conclusion deals with the notion of positive behavioral side-effects of treatment. The data showed that in this study, many of the identified positive behavioral correlates increased as the target behaviors were decreased using overcorrection procedures. Most significantly was the fact that head-orientation for all subjects increased markedly. Of importance is the notion that this behavior is extremely important as a requisite for learning to occur.

The third conclusion deals with the notion that overcorrection treatment of self-stimulatory behaviors is associated with decreases in negative, or undesirable behaviors. Of the 24 occasions for symptom substitution to occur, 23 showed no related movement. Thus, no symptom substitution was associated with the application of overcorrection procedures. Instead, it was found that decreases in the self-stimulatory target behavior were associated with similar decreases in the negative behavioral correlates.

In summary, overcorrection was shown to be effective in treating self-stimulatory target behaviors, such as object-rolling. hand-wringing, hand-flapping, and repetitive verbalizations. Moreover, the application of overcorrection treatments was associated with both increases in adaptive behaviors, and also decreases in maladaptive behaviors of severely emotionally disturbed children.

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APPENDIXES

APPENDIX A

Information Given To Parents

CONSENT FORM

The Department of Special Education, University of Kansas, supports the practice of protection for human subjects participating in research. The following information is provided so that you can decide whether you wish to participate in the present study. You should be aware that even if you agree to participate you are free to withdraw at any time.

The study is concerned with a method, Overcorrection, which may be used by parents with their children at home to decrease or eliminate specific undesirable behaviors. These behaviors may include head-banging, hand-flapping, and repetitive verbalizations, which may present you and your children with serious and long-standing problems. You will be asked to learn how to observe and record particular problem behaviors, learn and conduct specific techniques to decrease the behavior problem. It will be necessary that you allow an observer into your home on a frequent basis in order that he might record various aspects of your child's behavior as he responds to your treatment. Observation periods are expected to last a maximum of thirty (30) minutes per visit.

Your participation is solicited, but is strictly voluntary. Do not hesitate to ask any questions about the study. Be assured that your name will not be associated in any way with the research findings. We appreciate your cooperation very much.

Sincerely,

Richard L. Simpson Ed.D.
Principal Investigator

Carl R. Swenson
Principal Co-Investigator

_____
Child's name

_____
Signature of parent or guardian

_____
Date

The effects and side-effects of overcorrection procedures for self-stimulatory behavior applied by parents of severely emotionally disturbed children in natural home settings.

The following information will be provided to all participants prior to accepting their consent to participate.

1. Purpose of Study

The study will be conducted to determine if parents of severely emotionally disturbed children can effectively decrease self-stimulatory behaviors in their own children through the use of specific overcorrection procedures. All treatment will be conducted in the child's natural home setting and will be applied by the child's own parent or guardian. Other aspects (positive and negative) of the child's behavior will be observed to determine if systematic changes in them occur as a function of changes in the target behavior. Although overcorrection is a relatively novel technique, its effectiveness with similar behavior and with different types of children has been well documented.

2. Discomforts or Risks for Subjects that might result from the Research Procedures

Very little discomfort or risk to the children is anticipated, as this procedure is viewed to be only mildly aversive, and in no instance will cause the child any pain.

3. Benefits for the Subjects Associated with the Study

In addition to the direct service to the child and

parent, it is anticipated that the parents will receive some emotional support as a function of being involved with the study. There is also the possibility that positive side-effects of the treatment may occur. According to the literature, there is a lesser probability that negative side-effects may occur.

4. Alternative Procedures

According to the relevant literature, only electric shock has been demonstrated to be as effective as over-correction. We are therefore faced with electric shock or no treatment as alternatives to the overcorrection procedure. It is the investigator's opinion that there are no clear-cut alternatives to overcorrection for treating these self-stimulatory behaviors.

5. An Offer to Answer Questions or Inquiries

Questions or inquiries regarding the investigation will be solicited from the subjects and their parents/guardians prior to providing them an opportunity to sign the investigation consent form.

APPENDIX B

Operationalized Treatment Plans

Subject 1: Object-rolling

Treatment Instructions for Hand Movements

Child's Behavior	Parent's Behavior
Everytime the behavior is seen by the parent or manager.... The behavior is treated at all times, in all places, and during all events/activities....	1. Say, "Stop moving your fingers". 2. Approach child immediately, but not hurriedly. 3. Remove object from hand, if present. Place it out of reach. 4. Stand behind child, stand him up, if necessary, and request him to perform the following Functional Hand Movements. 5. Say, a. Hands straight out in front. b. Hands in pockets c. Hands down at sides. d. Hands on table or other solid surface (separated). e. Hands straight out at sides. 6. Each position is maintained for 15 seconds. 7. Do not talk to child during Treatment. 8. Give any 12 commands, in random order. 9. Use Manual Guidance to hold hands in position, if needed. 10. Total time for this exercise is 3 minutes. 11. Allow child to return to previous activity, if desired. A simple verbal command will suit this purpose.

*Apply all procedures without showing or conveying anger, frustration or other intense feelings.

**Child should never be allowed to avoid the Treatment, even if he stops Hand Movements.

Subject 2: Hand-wringing

Treatment Instructions for Hand Movements

Child's Behavior		Parent's Behavior	
Everytime the behavior is seen by the parent or manager... The behavior is treated at all times, in all places, and during all events/activities....	Hand-wringing with contact to mouth.	*Say, "Stop putting your fingers in your mouth". *Approach child immediately, but not hurriedly. *Remove object if present. Place it out of reach.	**1. Take child to bathroom. 2. (one minute) Child brushes teeth with mouthwash. 3. (30 seconds) Child washes fingers with soap and warm water, followed by drying his hands with a face cloth. 4. (30 seconds) Child massages lotion into his hands.
	Hand-wringing without contact to mouth.	*Say, "Stop playing with your fingers". *Approach child immediately, but not hurriedly. *Remove object if present. Place it out of reach.	1. Stand behind child and ask him to perform the following Functional Hand Movements. a. Hands straight out at sides. b. Hands in pockets. c. Hands on table and separated. d. Hands down at sides. e. Hands straight out in front. 2. Each position is maintained for 15 seconds. 3. Do not talk to child during Treatment. 4. Give any 12 commands, in random order. 5. Use Manual Guidance to hold hands in position, if needed. 6. Total time for this exercise is 3 minutes. 7. Allow child to return to previous activity, if desired. A simple verbal command will suit this purpose.

*Apply all procedures without showing or conveying anger, frustration, or other intense feelings.

**Child should never be allowed to avoid the Treatment, even if he stops Hand Movements when you approach him.

Subject 3: Hand-flapping

Treatment Instructions for Hand Movements

Child's Behavior	Parent's Behavior
Everytime the behavior is seen by the parent or manager.... The behavior is treated at all times, in all places, and during all events/activities....	1. Say, "Stop moving your fingers". 2. Approach child immediately, but not hurriedly. 3. Remove object from hand, if present. Place it out of reach. 4. Stand behind child, stand him up, if necessary, and request him to perform the following Functional Hand Movements. 5. Say, a. Hands straight out in front. b. Hands in pockets. c. Hands down at sides. d. Hands on table or other solid surface (separated). e. Hands straight out at sides. 6. Each position is maintained for 15 seconds. 7. Do not talk to child during Treatment. 8. Give any 12 commands, in random order. 9. Use Manual Guidance to hold hands in position, if needed. 10. Total time for this exercise is 3 minutes. 11. Allow child to return to previous activity, if desired. A simple verbal command will suit this purpose.

*Apply all procedures without showing or conveying anger, frustration, or other intense feelings.

**Child should never be allowed to avoid the Treatment, even if he stops Hand Movements.

Subject 4: Repetitive Verbalizations

Treatment Instructions for Repetitive Verbalizations

Child's Behavior	Parent's Behavior
Everytime the behavior is heard by the parent or manager.... The behavior is treated at all times, in all places, and during all events/activities....	1. Approach child immediately, but not hurriedly. 2. Say, "Terry, be quiet". 3. Place hand over child's mouth with fingers under chin. Other hand may be placed behind child's head, if needed, to keep him stationary, either standing or sitting. 4. Keep hand(s) in place for at least 30 seconds. 5. Do not talk to child while hand is over mouth. 6. After 30 seconds have passed, remove hand from over his mouth. Do this, only if the child has been quiet for the last 5 seconds. Otherwise, keep hand over mouth for an extra 5 seconds of silence, then remove hand. 7. Say, "Good being quiet". 8. Allow child to return to previous activity, if desired. A simple verbal command will suit this purpose.

*Apply all procedures without showing or conveying anger, frustration, or other intense feelings.

**Child should never be allowed to avoid the Treatment, even if he quiets down when you approach him.